U. S. Steel Corporation
Minnesota Ore Operations
P.O. Box 217
Mountain Iron, MN 55768

April 4, 2014

Mr. Tim Smith
U.S. Army Corps of Engineers
Regulatory Division
180 5th St. East, Suite 700
St. Paul, MN 55101

Ms. Colleen Allen
Minnesota Department of Natural Resources
Division of Lands and Minerals
500 Lafayette Road N
St. Paul, MN 55155

Mr. Jim Brist
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155

RE: **Permit Application for Water/Wetland Projects**
United States Steel Corporation, Minnesota Ore Operations – Minntac
Western Tailings Basin Seepage Collection System

Dear Mr. Smith, Mr. Brist and Ms. Allen:

Enclosed is a Minnesota Local/State/Federal Application Form for Water/Wetland Projects for the Western Seepage Collection System Project proposed by United States Steel Corporation, Minnesota Ore Operations – Minntac (Minntac). The Application includes the following documents for your review:

- Part I: Basic Application-Additional Information
- Appendix A – Figures 1-9
- Appendix B – Lateral Effect Calculations
- Appendix C – Western Seepage Collection System Phase II Report and Selected Drawings
- Appendix D – West Tailings Basin Wetland Delineation Report

Please feel free to contact me if you have any questions or require additional information. You can contact me at 218-778-8672.

Sincerely,

Tracy M. Muck
Environmental Control
U. S. Steel Corporation

CC: Chrissy Bartovich, U. S. Steel
Tom Moe, U. S. Steel
John Thomas, MPCA

Minnesota Local/State/Federal Application Form for Water/Wetland Projects

For Internal Use Only			
Application No.	Field Office Code	Date Initial Application Received	Date initial Application Deemed Complete

PART I: BASIC APPLICATION

"See HELP" directs you to important additional information and assistance in Instructions, Page 1.

1. LANDOWNER/APPLICANT CONTACT INFORMATION *(See Help 1)*

Name: US Steel Corporation – Minnesota Ore Operations c/o Tracy Muck Phone: 218-778-8672 email: tmmuck@uss.com

Complete mailing address: 8819 Old Highway 169, Mt. Iron, MN 55768

1A. AUTHORIZED AGENT *(See Help 1A) (Only if applicable; **an agent is not required**)*

Name: Phone: E-mail:

Complete mailing address:

2. NAME, TYPE AND SIZE OF PUBLIC WATERS or WETLANDS IMPACTED (Attach *Additional Project Area* sheets if needed)

Name or I.D. # of Waters Impacted (if applicable; if known):

(Check all that apply): ☐ Lake ☐ River ☐ Circular 39 Wetland type: ☐ 1, ☐ 1L, ☐ 2, ☒ 3, ☒ 4, ☒ 5, ☒ 6, ☒ 7, ☐ 8

Wetland plant community type[1]: ☒ shallow open water, ☒ deep marsh, ☒ shallow marsh, ☐ sedge meadow, ☐ fresh meadow, ☐ wet to wet-mesic prairie, ☐ calcareous fen, ☐ open bog or coniferous bog, ☒ shrub-carr/alder thicket, ☒ hardwood swamp or coniferous swamp, ☐ floodplain forest, ☐ seasonally flooded basin

Indicate size of entire lake or wetland (check one): ☐ Less than 10 acres (indicate size:) ☐ 10 to 40 acres ☒ Greater than 40 acres

3. PROJECT LOCATION *(Information can be found on property tax statement, property title or title insurance):*

Project street address: USS-Minntac (West Tailings Basin) Fire #: City (if applicable): Mountain Iron

¼ Section: Section: Multiple. Township #: 59N Range #: 18-19W County: St. Louis

Lot #: Block: Subdivision: Watershed (name or #) 73 UTM location: N E

Attach a simple site locator map. If needed, include on the map written directions to the site from a known location or landmark, and provide distances from known locations. Label the sheet *SITE LOCATOR MAP.* **(SEE FIGURE 1 AND ATTACHED ADDITIONAL INFORMATION)**

4. TYPE OF PROJECT: Describe the type of proposed work. Attach *TYPE OF PROJECT* sheet if needed. **(SEE ATTACHED ADDITIONAL INFORMATION)**

5. PROJECT PURPOSE, DESCRIPTION AND DIMENSIONS: Describe what you plan to do and why it is needed, how you plan to construct the project with dimensions (length, width, depth), area of impact, and when you propose to construct the project. **This is the most important part of your application. See HELP 5 before completing this section; see What To Include on Plans** (Instructions, page 1). Attach *PROJECT DESCRIPTION* sheet. **(SEE ATTACHED)**

Footprint of project: Approximately 25 acres or 1,089,000 square feet drained, filled or excavated.

6. PROJECT ALTERNATIVES: What alternatives to this proposed project have you considered that would avoid or minimize impacts to wetlands or waters? List at least **TWO** additional alternatives to your project in Section 5 that avoid wetlands (one of which may be "no build" or "do nothing"), and explain why you chose to pursue the option described in this application over these alternatives. Attach *PROJECT ALTERNATIVES* sheet if needed. **(SEE ATTACHED)**

7. ADJOINING PROPERTY OWNERS: For projects that impact more than 10,000 square feet of water or wetlands, list the complete mailing addresses of adjacent property owners on an attached separate sheet. (See **HELP 7**) **(SEE ATTACHED)**

8. PORTION OF WORK COMPLETED: Is any portion of the work in wetland or water areas already completed? ☐ Yes ☒ No. If yes, describe the completed work on a separate sheet of paper labeled **WORK ALREADY COMPLETED.** (See **HELP 8**)

9. STATUS OF OTHER APPROVALS: List any other permits, reviews or approvals related to this proposed project that are either **pending** or **have already been approved or denied on a separate attached sheet. See HELP 9. (SEE ATTACHED)**

10. I am applying for state and local authorization to conduct the work described in this application. I am familiar with the information contained in this application. To the best of my knowledge and belief, all information in Part I is true, complete, and accurate. I possess the authority to undertake the work described, or I am acting as the duly authorized agent of the applicant.

Signature of applicant (Landowner)	*Date*	*Signature of agent (if applicable)*	*Date*
[signature]	4-4-2014		

This block must be signed by the person who desires to undertake the proposed activity and has the necessary property rights to do so. If only the Agent has signed, please attach a separate sheet signed by the landowner, giving necessary authorization to the Agent.

[1]See *Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, 1997)* **as modified by the Board of Water and Soil Resources, United States Army Corps of Engineers.**

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33 CFR 325) **OMB APPROVAL NO. 0710-003 Expires Dec 31, 2004**

ITEMS 1 THROUGH 4 TO BE FILLED IN BY THE CORPS

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED

YOU *DO NOT* NEED TO COMPLETE ITEMS 6-10 and 12-25 in the SHADED AREAS.

All applicants must complete **non-shaded** items 5 and 26. If an agent is used, **also** complete items 8 and 11. This optional Federal form is valid for use ***only*** when included as part of this entire state application packet.

5. APPLICANT'S NAME Lawrence Sutherland	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)
6. APPLICANT'S ADDRESS	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NO.	10. AGENT'S PHONE NO.

11. STATEMENT OF AUTHORIZATION *(if applicable; complete* **only** *if authorizing an agent)*

I hereby authorize to act on my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT"S SIGNATURE: _____ DATE: _____

12. PROJECT NAME OR TITLE (see instructions)	
13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
15. LOCATION OF PROJECT	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)	
17. DIRECTIONS TO THE SITE	18. NATURE OF ACTIVITY
19. PROJECT PURPOSE	20. REASON(S) FOR DISCHARGE
21. TYPES OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS	
22. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED	
23. IS ANY PORTION OF THE WORK ALREADY COMPLETE? YES ____ NO ____ IF YES, DESCRIBE COMPLETED WORK	
24. ADDRESSES OF ADJOINING PROPERTY OWNERS,	
25. LIST OF OTHER CERTIFICATIONS OR APPROVALS/DENIALS RECEIVED FROM OTHER FEDERAL, STATE OR LOCAL AGENCIES FOR WORK DESCRIBED IN THIS APPLICATION.	

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Lawrence Sutherland 4-4-2014

Signature of applicant Date Signature of agent (if any) Date

The application must be signed by the person who desires to undertake the proposed activity (applicant), or it may be signed by a duly authorized agent if the statement in Block 11 has been filled out and signed. **18 U.S.C. Section 1001** provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up with any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

ENG FORM 4345, Jul 97 EDITION OF FEB 94 IS OBSOLETE. (Proponent: CECW-OR)

FOR LGU USE ONLY:

Determination for Part 1:
- ☐ No WCA Jurisdiction
- ☐ Exempt: No. ____ (per MN Rule 8420.0122)
- ☐ No Loss: ____ (A,B,. . .G, per MN Rule 8420.0220)
- ☐ Wetland Boundary or type
- ☐ Replacement required – applicant must complete Part II

COMPLETE THE SECTION BELOW ONLY IF REPLACEMENT IS NOT REQUIRED:

Application is (check one): ☐ Approved ☐ Approved with conditions (conditions attached) ☐ Denied

Comments/Findings: _____

_____ _____

LGU official signature *Date*

_____

Name and Title

For Agricultural and Drainage exemptions (MN Rule 8420.0122 Subps. 1 and 2B), LGU has received proof of recording of restrictions (per MN Rule 8420.0115):

_____ _____ _____

County where recorded *Date* *Document # assigned by recorder*

_____ _____

LGU official signature *Date*

Complete those portions of Part II: Replacement Plan Supplement for which information is readily available (such as location, existing land use, size of impact area, etc.) A person certified in wetland delineation must determine items pertaining to specific wetland impacts (wetland type, predominant vegetation, watershed name, etc.) Contact the local soil and water conservation district (SWCD) office for further information on obtaining such items.

What to Include on Plans

Detailed overhead views of replacement site(s) (Part II), as well as profile view(s) of replacement site(s) (Part II), may be either hand drawn, computer generated or professionally prepared, as long as they contain all necessary information clearly, accurately, and in adequate detail. Please include specific dimensions whenever possible. You may also include photos, if you wish.

Overhead views of Part II replacement site(s) should include the following items that pertain to your project:

- Property boundaries and/or lot dimensions.
- Location and extent of shoreline, wetlands and water.
- Location and dimensions of proposed project, structure or activity. Include length, width, elevation and other measurements as appropriate.
- Points of reference (such as existing homes, structures, docks or landscape features).
- Location of inlet and outlet structures.
- Indication of north.
- Location of spoil and disposal sites (if applicable).
- Areas of wetland and upland plants established.

Profile views (side or cross-sectional views) should include the following items that pertain to your project:

- Location and dimensions of proposed project, structure or activity. Include elevation, depth, soil profile, side slope and other measurements as appropriate.
- Proposed water level elevation.

Final Checklists
Part II: Replacement Plan Supplement

☐ **Have you completed all of Part II** (pages 3-5)?
☐ **Did you (or your agent) sign Section 19** on page 5?
☐ **Have you included the necessary attachments for Part II?**

Attachments *must* include:
☐ **If the project includes any wetland banking** (complete or partial), include Application for Withdrawal of Wetland Credits Form (Section 14)
☐ **If the project includes any project-specific replacements** (complete or partial), include:
- Description of Replacement Wetland(s) Construction (Section 15)
- Copy of vegetation management plan (Section 15)
- Scale drawing of overhead view or replacement wetland (Section 18)
- Scale drawing of profile view of replacement wetland (Section 18)

Attachments *may* also include:
☐ Additional description of Wetland Impact Charts (Section 11) (if additional space was needed)
☐ Additional Description of Replacement Wetlands charts (Section 17) (if additional space was needed)
☐ Additional soils information for created replacement wetland(s) (Section 18) (if available)

Note: To deposit surplus wetland credits in the State Wetland Bank, submit a Wetland Banking Application directly to your LGU (Section 16).

Preparing Your Application for Mailing

☐ **To apply for both state and Federal authorization, your application must include Part I** (Page 1), **the Federal application** (Page 2), **and attachments** as indicated on *Final Checklist for Part I* (Instructions, Page 2).
☐ **Your application must also include Part II** (Pages 3-5) and additional attachments as indicated on *Final Checklist for Part II* (above).
☐ **Make three copies of the entire application and all attachments.** Keep the original, and mail the three copies to the appropriate local, state, and Federal agencies (see Instructions for Part I for addresses).

PART II: REPLACEMENT PLAN SUPPLEMENT

For assistance in completing Part II, contact your Local Government Unit or a professional consultant

11. DESCRIPTION OF WETLAND IMPACTS: Complete the chart below: 1) Use one row of boxes for each wetland impact; 2) If your project has more than one wetland impact, reference your overhead view (part of Section 5) to this chart by identifying and labeling "first impact" and "second impact" **on your overhead view;** 3) If you are identifying only one wetland type within a given wetland impact area, use the first dotted line and leave the others blank; 4) If you have chosen to identify more than one wetland type within a given wetland impact area, use the extra dotted lines to indicate each wetland type, and identify predominant vegetation and size of impacted area **for each separate wetland type within that impact area;** 5) If you do not have access to some of this information, call your LGU or SWCD office for assistance. *(Photocopy chart for more impacts, if needed.)* **(SEE ATTACHED - TABLE 2)**

DESCRIPTION OF WETLAND IMPACTS

Wetland impact *(as noted on overhead view)*	Watershed name or number *(if known)*	Watershed and Bank Service Area	Wetland plant community type[1]	Predominant vegetation in impacted wetland area	Size of area impacted (in acres or square feet)	Existing land use in project area (check all that apply)
First impact	Littlefork River	Littlefork River / 2	Shallow Marsh	*Typhia x glauca, Carex l. Calamogrostis*	1.61	☐ **Housing** ☐ **Commercial** ☐ **Industrial** ☐ **Parks/recreation areas** ☐ **Highways and associated rights-of-way** ☐ **Forested** ☐ **Farmsteads/agricultural** ☒ **Vacant lands** ☐ **Public and semi-public (schools/gov't facilities)** ☐ **Airports** ☐ **Extractive (gravel pits/quarries)** ☐ **Other:**
		Littlefork River / 2	Deep Marsh	*Typha x glauca, Carex l.*	1.83	
		Littlefork River / 2	Shallow Open Water	Submerged macrophytes	7.82	
		Littlefork River / 2	Alder Thicket	*Alnus i., Calamogrostis c., Carex spp.*	4.18	
		Littlefork River / 2	Coniferous Swamp	*Picea m., Larix l., Alnus i. Calamogrostis*	9.83	
Second impact					--	
					--	
					--	

[1]If you are identifying only one wetland type within a given wetland impact area, use the first dotted line and leave the others blank. If you have chosen to identify more than one wetland type within a given wetland impact area, use the extra dotted lines to indicate each separate wetland type, and identify predominant vegetation and size of impacted area **for each separate wetland type with that impact area.**

***TOTALS* OF AREA(S) IMPACTED FOR EACH WETLAND TYPE ON CHART** (*indicate acres* ☒ *or square feet* ☐)

Wetland plant community type [1]: Shallow open water: 7.82 **Deep marsh**: 1.84 **Shallow Marsh**: 1.61 **Sedge meadow**: **Fresh wet meadow**: **Wet to wet mesic prairie**: **Calcareous fen**: **Open bog or coniferous bog**: **Shrub carr or alder thicket**: 4.19 **Hardwood swamp or coniferous swamp**:9.82 **Floodplain forest** **Seasonally flooded basin**

12. SPECIAL CONSIDERATIONS: Are you aware of any special considerations that apply to either the impact site(s) or the replacement site(s)? ☐ Yes ☒ No (Examples: the presence of endangered species, special fish and wildlife resources, sensitive surface waters, or waste disposal site.) If YES, list and describe briefly.

The Dark River is mapped as a DNR Protected Watercourse to the south line of Sec. 12, Twp. 59N. R19W. The Dark River will not be directly impacted, but three tributaries to the Dark River extend into the project area and may be impacted by reduced flows resulting from interception and pump back of tailings basin seeps.

13. SHORELAND IMPACT ZONE: Please identify each wetland impact site noted in Section 15 that is within 1000 feet of a lake or 300 feet of a river. The Dark River is located approximately 1000 feet west of the Project. The Shoreland District of this river does not extend to any impacted wetlands within the project area.

[1] See *Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, 1997)* as modified by the Board of Water and Soil Resources, United States Army Corps of Engineers.

14. HOW PROPOSED REPLACEMENT WILL BE ACCOMPLISHED: Indicate how proposed replacement will be accomplished (check only **one** box below and continue as indicated):

☒ A. Wetland banking credits only
Complete *Application for Withdrawal of Wetland Credits Form* and include with your application. Copies of this form are available from your LGU, or download a copy from www.bwsr.state.mn.us

Skip to Section 19, page 6 (You do not need to complete Sections 15-18).

☐ B. Project-specific replacement only
Continue with Section 15 below.

☐ C. A Combination of wetland banking and project-specific replacement. If using project specific replacement that will result in surplus wetland credits that you propose to deposit in the state wetland bank for future use, then you must submit a wetland banking application directly to your LGU before or concurrently with submittal of this form. Also, Complete *Application for Withdrawal of Wetland Credits Form* and include with your application. Copies of this form and the wetland banking application is available from your LGU, or download a copy from www.bwsr.state.mn.us
Continue with Section 15 below.

15. DESCRIPTION OF REPLACEMENT WETLAND(S) CONSTRUCTION (Complete this section only if you marked Box B or Box C in Section 14 above):
Describe in detail how replacement wetland(s) will be constructed. If several methods will be used, describe each method. Details should include the following: 1) type of construction (such as excavated in upland, restored by tile break, restored by ditch block or revegetated); 2) type, size and specifications of outlet structures; 3) elevations relative to Mean Sea Level or established benchmarks or key features (such as sill, emergency overflow or structure height); 4) what best management practices will be implemented to prevent erosions or site degradation; 5) proposed timetable for starting and ending the project; and 6) a vegetation management plan. Write this description on a separate sheet of paper labeled *DESCRIPTION OF REPLACEMENT WETLAND CONSTRUCTION.*

16. SURPLUS WETLAND CREDITS: If using project-specific replacement (Box B or Box C in Section 14 above), will the replacement result in any surplus wetland credits that you wish to have deposited in the State Wetland Bank for future use? ☐ Yes ☒No. If yes, **submit a Wetland Banking Application directly to your LGU** before or concurrently with submittal of this form. Copies are available from your LGU, or download a copy from www.bwsr.state.mn.us

17. DESCRIPTION OF REPLACEMENT WETLANDS: Complete the chart below: 1) Use one row of boxes for each wetland replacement site; 2) If your project has more that one wetland replacement site, reference your overhead view (part of Section 5) to this chart by identifying and labeling "first replacement site" and "second replacement site" **on your overhead view;** 3) If you are identifying only one wetland type within a given replacement site, use the first dotted line(s) and leave the others blank; 4) If you have chosen to identify more than one wetland type in a given replacement site, use the extra dotted lines to indicate each separate wetland type, and identify type(s) of replacement credits and "restored or created" **for each separate wetland type with that replacement site;** 5) If you do not have access to some of the information, or if you do not know your replacement ratio, call your LGU or SWCD office for assistance. *Photocopy chart for more wetland replacements, if needed.)*

DESCRIPTION OF REPLACEMENT WETLANDS

Identify Wetland replacement site *(as noted on overhead view)*	Watershed name or number *(if known)* Bank Service Area	County	Section, Township, Range	Wetland Plant Community Type[1]	Type(s) of replacement credits *(in acres or square feet)*		Restored or created? Indicate R or C
					New Wetland Credits (NWC)	Public Value Credits (PVC)	
Palisade III (Bank Site)	Mississippi River	Aitkin	E ½ of NW ¼, S ½ of NE ¼, E ½ of SW ¼, and SE ¼ of Section 34 and S ½ of SW ¼ of Section 27, of T.49N., R.24W.	Sedge Meadow	37.91		R
Name of Second replacement site							
If you are identifying only one wetland type within a given wetland impact area, use the first dotted line and leave the others blank. If you have chosen to identify more than one wetland type within a given wetland impact area, use the extra dotted lines to indicate each separate wetland type, and identify predominant vegetation and size of impacted area for **each separate wetland type within that impact area.**					37.91 **TOTAL NWC**	**TOTAL PVC**	
					REQUIRED REPLACEMENT RATIO: *(If known)*	1.5:1	

Wetland plant community type: Shallow open water: **Deep marsh:** **Shallow Marsh:** **Sedge meadow:** 37.91
Fresh wet meadow: **Wet to wet mesic prairie:** **Calcareous fen:** **Open bog or coniferous bog:** **Shrub carr or alder thicket:**

Hardwood swamp or coniferous swamp: **Floodplain forest** **Seasonally flooded basin**

*** See *Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, 1997)* as modified by the Board of Water and Soil Resources, United States Army Corps of Engineers.**

18. ADDITIONAL INFORMATION REQUIRED FOR PROJECT-SPECIFIC REPLACEMENT (Required *only* if you marked Box B or Box C in Section 14):
For projects involving at least some project-specific replacement, include the following additional information:

☐ **Two drawings to scale** of the replacement wetland. Include both overhead view and profile (side view or cross-sectional view). See *What to Include on Plans* (Instructions, Page 3) for a detailed description of what should be included in these drawings. Without drawings, **your application will be considered incomplete.**

☐ **For created replacement wetlands,** include additional soils information (if available) that indicates the capability of the site to produce and maintain wetland characteristics.

Note 1: For replacement wetlands located on pipeline easements, you need to receive endorsement of your project from both the easement holder and the Minnesota Department of Public Safety's Office of Pipeline Safety. Before start of construction, the owner of any utilities must be notified. The landowner or contractor is responsible for giving this notice by calling "Gopher State One-Call" at 652–454-0002 (Twin Cities Metro Area) or 1-800-252-1166 (all other locations).

Note 2: For extensive or complex projects supplementary information may be requested at a later dated from one or more of the responding agencies. Such information may include (but not be limited to) the following: topographic map, water table map, soil borings, depth soundings, aerial photographs, environmental assessment and/or engineering reports.

19. SIGNED AFFIRMATION:

FOR PROJECTS INVOLVING REPLACEMENT BY WETLAND BANKING ONLY. To the best of my knowledge and belief, all information in Part II is true, complete and accurate; and I affirm that the wetland losses will be replaced via withdrawal from an account in the State Wetland Bank.

FOR PROJECTS INVOLVING EITHER PROJECT-SPECIFIC REPLACEMENT ONLY OR A COMBINATION OF WETLAND BANKING AND PROJECT-SPECIFIC REPLACEMENT:

Part A: The replacement wetland. I affirm that the replacement wetland was not:
Previously restored or created under a prior approved replacement plan or permit; **AND**
Drained or filled under an exemption during the previous 10 years; **AND**
Restored with financial assistance from public conservation programs; **AND**
Restored using private funds, other than landowner funds, unless the funds are paid back with interest to the individual or organization that funded the restoration; and the individual or organization notifies the local government unit in writing that the restored wetland may be considered for replacement.

Part B: Additional assurances (check **all** that apply):
☒ The wetland will be replaced before or concurrent with the actual draining or filling of a wetland.
☐ An irrevocable bank letter of credit, performance bond, or other acceptable security has been provided to guarantee successful completion of the wetland replacement.
☐ The wetland losses will be replaced via withdrawal from an account in the State Wetland Bank.

Part C. For projects involving any project-specific replacement: Within 30 days of either receiving approval of this application or beginning work on the project, I will record the Declaration of Restrictions and Covenants on the deed for the property on which the replacement wetland(s) will be located; and I will at the same time submit proof of such recording to the LGU.

To the best of my knowledge and belief, all information in Part II is true, complete and accurate; and I affirm all statements in Part A and C, as well as checked assurance(s) in Part B.

Signature | 4-4-2014

Signature or applicant or agent *Date*

FOR LGU USE ONLY

Replacement plan is (check one): ☐ Approved ☐ Approved with conditions (conditions attached) ☐ Denied

_____ _____
LGU official signature *Date*

LGU has receive evidence of title and proof of recording of Declaration of Restrictions and Covenants for Replacement Wetland:

_____ _____ _____
County where recorded *Date* *Document # assigned by recorder*

_____ _____
LGU official signature *Date*

PART I: BASIC APPLICATION
Additional Information

U. S. Steel Corporation – Minnesota Ore Operations
Minntac Western Seepage Collection Project

3. Project Location

The Minntac Western Seepage Collection Project (Project) is located along the west side of the U. S. Steel Corporation (USS) Minntac tailings basin dike, which in turn is located near the town of Mountain Iron, St. Louis County, Minnesota **(Figures 1 and 2, Appendix A)**.

The Project is located within the following sections:

- Sections 6, 7, 18, 19, and 30 of Township 59N, Range 18W
- Sections 24 of Township 59N, Range 19W

4. Type of Project

The Minntac tailings basin is approximately 8,000 acres in size and consists of perimeter water-retaining dams, two clear water pools operated in series (Cell #1 and Cell #2), and internal fine tailings cells. Previous studies have identified the seepage from the basin as containing elevated levels of certain constituents (e.g., hardness, total dissolved solids, specific conductance, and possibly sulfate) which may not currently be in compliance with existing Minnesota surface water quality standards. As required by a June 9, 2011 Schedule of Compliance agreement between USS and the Minnesota Pollution Control Agency, a surface seepage collection and return system was designed by Hatch/USS. The proposed system will be similar to the seepage collection and return system installed at the east side of the Minntac tailings basin in June of 2011. Project design is detailed in the Phase 2 Design Report for the Minntac Western Seepage Collection Project (**Appendix C)**.

5. Project Description

Minntac is an iron ore mining and processing facility. During the processing of the ore, fine tailings (the non-magnetic fraction of the ore) are sent to the tailings basin in slurry form. Decant from the fine tailings slurry is reclaimed and recirculated as process water in a nearly closed loop system. While most of the reclaimed water returns to the plant, some seepage occurs from the tailings basin perimeter dams.

The purpose of the Project is to collect surface seepage water from the west tailings basin perimeter dike and return it back to the basin to reduce the impact of surface seepage on downstream water quality. The proposed project consists of surface collection swales, interconnecting piping, pumping stations, wetland separation sheet-pile walls, and an access road. Construction is planned to begin as soon as all necessary approvals and permits are obtained, and after final engineering and project authorization by U. S. Steel.

5.1. Seepage Collection System

The seepage collection system utilizes a combination of existing ponds, drainage swales, french drains, and natural drainage, to collect surface seepage into catch basins. Seepage water collected in the catch basins then flows to pump stations, where it is pumped back to the tailings basin. The *U. S. Steel Corporation – Minnesota Ore Operations Minntac Western Seepage Collection System, Phase 2 Report* and Plans are attached in Appendix C. The following describes components of the seepage collection system:

French Drains: The french drain will consist of excavation to grade and placement of filter material, 12-inch perforated pipe and backfill of rock over the pipe and trench. The french drain will slope towards a central catch basin, which will outlet to a pump. The project includes one french drain.

Collection Swales: The natural topography of the area combined with grading of the existing ground surface will be used to form collection swales to transport surface seepage into catch basins. Construction of collection swales will include removal of top soil and organics to expose the subgrade. Coarse tailings or blast furnace trim will then be placed over the subgrade and compacted in place to finished grade. The project includes several collection swales.

Catch Basins and Pump Stations: Seepage water collected in the french drains and collection swales will be routed to catch basins situated at low points within the localized catchment area. Seepage water entering the catch basins will then be conveyed to pump stations and pumped into the tailings basin. A total of four catch basins and four pump stations will be required. Water will be pumped from the four pump stations back into the tailings basin via HDPE forcemain ranging from 4 to 18 inches in diameter. All forcemain will be installed by open cut construction methods.

The rim elevation of catch basins will be at the elevation of the adjacent ground or approximate normal water level elevation of the adjacent wetland area. It is anticipated that water will pool within the catch basins and the isolated catchment areas under design storm conditions (100 year-24 hour event). The pumps are sized to recover the impounded storm water runoff volume over a one week period.

Access Roads: Access roads will be constructed to access construction areas, serve as platforms to install wetland separation measures (e.g., sheet-pile) and provide maintenance access during operation. An existing access road will be utilized to the extent possible to minimize construction of new road and impacts to wetlands. At other locations, a new access road will need to be constructed. Access roads will be constructed to a width of 30 feet in order to accommodate construction traffic. Access roads will be constructed from waste rock and coarse tailings and will include four foot high safety berms along either side.

Wetland Separation Measures: Wetland separation measures will be installed at specific locations to prevent dewatering of wetlands adjacent to the seepage collection system and promote additional seepage capture/collection. The wetland separation measures are designed to limit the lateral effect of seepage collection systems on adjacent wetlands as well as limit surface water flows into the seepage collection system from adjoining areas. The separation measures will consist of sheet piling barrier placed along the edge of the access road. The sheet pile barrier will be placed to minimize seepage from the adjacent wetland to the seepage collection system while not obstructing the natural occurring groundwater flow. The sheet piling will be installed prior to construction of the drainage swales and french drains so that the construction area can be dewatered during construction.

5.2. Wetland Impact Analysis

Wetland impacts were evaluated by determining the footprint of major project elements with respect to delineated wetland boundaries. Wetland boundaries were delineated in 2011 and 2012 within a linear corridor that extended approximately 300 feet west and north from the outer tailings basin dike. These boundaries are denoted by a solid wetland boundary line in **Figures 4 through 10.** In a number of areas, the Western Seepage Collection System extends beyond the 2011/2012 wetland delineation corridor. These areas are generally a continuation of wetland areas that extend west or north of the 2011/2012 delineated boundaries. In other areas, the Seepage Collection System extends into areas where wetland boundaries are estimated based on the 2011/2012 delineation, topography and aerial photography. Estimated wetland boundaries are shown as dashed lines in **Figures 4 through 10**. Wetland impact

calculations are based on both the 2011/2012 and estimated wetland boundaries. It is anticipated that estimated wetland boundaries will be reviewed by the Wetland Technical Evaluation Panel and if necessary, field verified/surveyed as soon as conditions permit during spring/summer of 2014.

The wetland impact analysis identified three categories of impact; direct, hydrologic and temporary impacts.

Direct Impacts

Direct wetland impacts include project elements that involve placement of fill, placement of structures and excavation within wetlands. Project elements in this category include:

Access Road: Approximately 8,500 linear feet of access road will be constructed. For purposes of calculating direct impacts, wetland separation barriers and earthen berms are considered part of the access road foot print. The portion of pump stations and forcemains that overlaps with access roads is also included as part of the access road foot print.

Pump Station: Four pump stations with catch basins will be constructed. Of these, portions of three pump station and catch basin footprints will be located within wetlands where they extend outside the footprint of existing or constructed access roads. A fifteen foot perimeter around pump stations and catch basins is used to define the area of wetland impacts for these facilities.

Drainage Swale: One drainage swale will be constructed to collect water from Seep #7 and #8. The drainage swale is not expected to dewater adjacent wetland areas, but rather to direct surface seepage to a low point where it will discharge into a catch basin. This assumption is consistent with similar drainage swales constructed on the east side of the tailings basin. Wetland impacts for the drainage swale are based on the footprint of the drainage swale. Additional drainage swales may be constructed at the SW corner of the project (Seep C) and the NW corner of the project (Seep #13) depending upon conditions encountered during construction. Wetland impacts resulting from the potential implementation of these drainage swale has been included in the impact totals.

Hydrologic Impacts

Hydrologic impacts include complete or partial loss of wetland hydrology. Hydrologic impacts are anticipated from two project elements; culvert placement at wetland/pond outlets and french drain/seepage collection systems.

Culverts: A culvert will be placed between the two southern-most wetland basins (W35A/W35B and W34). These two basins will then outlet to wetland W26G via a second culvert. Water levels in the two southerly wetland basins will be drawn down to divert Seep C to the north. Wetland W35A will also be excavated near the culvert outlet to facilitate drainage to the north. Both of these basins are assumed to be substantially drained after the culverts are installed. The entire acreage of these two basins is assumed to be impacted.

French Drain: A french drain will be installed within wetlands near Seep #4. This facility includes 2,270 linear feet of drainage swale with a 480 foot french drain located near the central low point of the swale. The french drain will extend from wetland W13B/W13H, north to wetland W10A. The north and south portions of this facility, which do not include perforated pipe, and would more accurately be described as drainage swales, are included here as part of hydrologic impacts associated with the french drain.

The south portion of the french drain within Wetland W13B/W13H will result in these wetlands being drained. The elevation of the french drain pipe within Wetland W13B/W13H will be at 840 feet, or approximately eleven feet below the normal water elevation of 851 feet and three feet below the approximate bottom elevation of the wetland, or 843 feet. For this reason, Wetland W13B/W13H is assumed to be fully drained.

For portions of the french drain north of Wetland W13B/W13H, the water table within adjacent wetlands will be drawn down. The lateral effect of the drain is defined as the distance away from the drain where wetland hydrology will no longer be supported after the drain is operating. Wetland hydrology is defined as having groundwater within 30 cm of the surface for 10 consecutive days during the growing season.

Lateral effect calculations and soil descriptions are shown in **Appendix B.** The analytical method used for this analysis was developed by Skaggs, et al (2005). Assumptions made for the analysis are:

- The area is flat with the water table at the ground surface
- Hydraulic conductivities are estimated from soil descriptions
- The depth to the restrictive layer below the French drain was set at 80 inches unless otherwise indicated by the soil description.

The french drain is designed so that it is 24 in below ground surface in the middle at the catch basin. The arms slope upward toward the ground surface away from the catch basin. The lateral effect is greatest near the catch basin, and tapers to zero at the ends of the french drain. The french drain will intersect two soils, the Bowstring and the Keewatin-Nashwauk complex soils. The lateral effect of the drain in the two soils is 75 feet and 17 feet, respectively. The impacted area extends from the edge of the french drain out to the calculated lateral effect distance, or to the edge of the road or impacted area within Wetland W13B/W13H, whichever is less. The extent of the calculated lateral effect and soil mapping units are shown on **Figure 3.**

Temporary Impacts

Temporary impacts are assumed to occur where forcemains and HDPE pipes are installed across wetlands. All pipes will be placed by excavating a trench, placing the pipe, backfilling and restoring the surface to preconstruction grade. All disturbed areas will be stabilized and seeded with an appropriate wetland seed mix. Temporary impact calculations assume pipes will be buried to a depth of five feet and require 3:1 slopes during construction, resulting in a 30 foot wide area of disturbance. Within forested wetlands, it is assumed that trees will be avoided where possible. There is one area where HDPE pipe installation potentially impacts wetlands. This potential impact is located at the northeast edge of wetland W26B. The forcemain alignment will be shifted north to avoid this impact. All other HDPE forcemain pipes will be located within existing or new access roads to avoid additional wetland impacts.

5.3. Summary of Wetland Impacts

Wetland impacts are shown in **Appendix A, Figures 4-10** and summarized in **Tables 1 and 2**. Discounting temporary impacts, which are expected to be avoided by shifting the alignment of a force main between wetland W26B and the tailings basin, direct and hydrologic impacts total 25.28 acres. Direct impacts total 14.78 acres and hydrologic impacts total 10.50 acres. Table 2 summarizes these impacts with respect to total impact by wetland type.

TABLE 1- SUMMARY OF WETLAND IMPACTS

Wetland ID	Wetland Type	Wetland Impact Summary		
		Type	Project Element	Acres
W5	6	Direct	Road	1.38
W6	7	Direct	Road	0.62
W6	7	Direct	Drainage Swale	0.03
W7B	6	Direct	Pump Station	0.08
W7B	6	Direct	Road	1.53
W7B	6	Direct	Drainage Swale	0.42
W8	7	Direct	Road	1.92
W10A	7	Direct	Pump Station	0.05
W10A	7	Direct	Road	3.12
W10A	7	Hydrologic	French Drain	1.19
W11B	3	Direct	Road	0.14
W11C	4	Direct	Road	0.13
W11D	7	Direct	Road	1.79
W13A	7	Direct	Road	0.47
W13B	5	Direct	Road	0.79
W13B	5	Hydrologic	French Drain	5.73
W13G	4	Direct	Road	0.20
W13G	4	Hydrologic	French Drain	0.13
W13H	4	Direct	Road	0.11
W13H	4	Hydrologic	French Drain	0.32
W26B	5	Temporary	Forcemain	0.02
W33A	6	Direct	Pump Station	0.02
W33A	6	Direct	Road	0.75
W33C	7	Direct	Road	0.64
W34	4	Direct	Road	0.31
W34	4	Hydrologic	Culvert Outlet	0.63
W35B	3	Direct	Road	0.27
W35B	3	Hydrologic	Culvert Outlet	1.20
W35A	5	Hydrologic	Culvert Outlet	1.29
			TOTAL	25.28

TABLE 2- SUMMARY OF IMPACTS BY WETLAND TYPE[1]

Wetland Plant Community Type		Acres By Type of Impact		
Eggers and Reed	**Predominant Vegetation in Impacted Area**	**Direct**	**Hydrologic**	**Total**
Shallow Marsh	*Typhia x glauca, Carex l. Calamogrostis c.*	0.41	1.20	1.61
Deep Marsh	*Typha x glauca, Carex l.*	0.76	1.08	1.84
Shallow Open Water	Submerged macrophytes	0.79	7.03	7.82
Alder Thicket	*Alnus i., Calamogrostis c., Carex spp.*	4.19		4.19
Coniferous Swamp	*Picea m., Larix l., Alnus i. Calamogrostis c.*	8.63	1.19	9.82
	TOTALS	14.78	10.50	25.28

[1]All impacts located in the Littlefork River watershed and BSA #2

6. Project Alternatives

Although no specific design alternative is presented as part of this permit application, other designs to collect seepage water from the west tailings basin have been explored in detail. In 2012, USS/Hatch completed a Phase I Design that included a much more extensive seepage collection system. The Phase I Design was rejected due to a number of technical issues, construction risks and a much larger area of wetland impact than the proposed Phase II Design.

6.1 No Build Alternative

This alternative considers not installing the surface seep collection and return system. However, Minntac must complete the seep collection project, as per a June 9, 2011 Schedule of Compliance entered into between USS and the Minnesota Pollution Control Agency. No practical or feasible alternatives exist that would avoid or further minimize wetland impacts.

6.2. Project Wetland Avoidance Measures

The construction activities and the installation of the seepage collection system are expected to result in a combination of direct and indirect hydrologic impacts to adjacent wetlands. The seepage collection system has been designed to avoid and minimize impacts to wetlands were possible. Complete avoidance is not possible since ground water seeps occur within low lying areas of the landscape and then flow overland or via subsurface interflow through natural drainage systems, both being settings where wetlands generally occur.

The following discusses key project elements with respect to wetland avoidance

<u>Access Road Construction</u>

Due to dam safety and integrity requirements, construction of the access roads cannot cut into the existing perimeter dike slope; therefore, the access road must be located away from the perimeter dike, limiting opportunities to utilize the perimeter dike to construct and operate the seepage collection return system. The width of the access road must be wide enough for large grading equipment to maintain the road and to allow for the appropriate berm size that meets Mine Safety and Health Administration (MSHA) requirements, limiting options to reduce the overall footprint of the access road. Where possible, the access road and seepage collection system facilities are being constructed over existing roads to reduce wetland impacts.

<u>Drainage Swales and French Drains</u>

The drainage swale design for the west tailings basin is similar to the east tailings basin, where impacts to adjacent wetlands have been limited. The purpose of drainage swales is not to drain wetlands, but to collect surface seepage water and direct it into catch basins where it can subsequently be pumped back to

the tailings basin. The drainage swale depth, extent and outlet elevation differences relative to adjacent grades will be limited as much as possible, while at the same time meeting channel slope and stability design requirements. The use of french drains is limited to approximately 480 linear feet of the total project area and will result in unavoidable wetland impacts to wetlands W13B, W13G, W13H and W10A. The location and elevation of french drains at this location is necessary to effectively capture tailings basin surface seeps. The use of drainage swales and french drains will be further limited by using existing, natural drainage systems to collect seepage water. Catch basin rim elevations will be set at or just below the normal water level of wetlands to maintain existing wetland hydrology.

Wetland Separation Measures

Separation walls will be constructed without directly impacting the adjacent wetlands. Separation wall installation will involve the use of specialized equipment to install the sheet-pile from the constructed access road. The design of the separation walls will minimize dewatering of the adjacent downstream wetlands. The installation depth of separation walls will be limited to 15 feet below grade, so as not to intercept the groundwater flow that recharges downstream wetlands.

7. Adjoining Property Owners

All adjacent land for a distance of approximately one mile is owned by U. S. Steel Corporation.

9. Permit Requirements

Permit requirements for the project have not yet been determined. In addition to State and Federal wetland permits, it is anticipated that Section 401 Certification will be required. NPDES permitting has been completed for this project. Cultural resource and archeological determinations have not been completed and it is not known at this time if they will be required. It is anticipated that an Environmental Assessment (EA) will be prepared as part of the Section 404 Permit for this project.

PART I: BASIC APPLICATION
Additional Information
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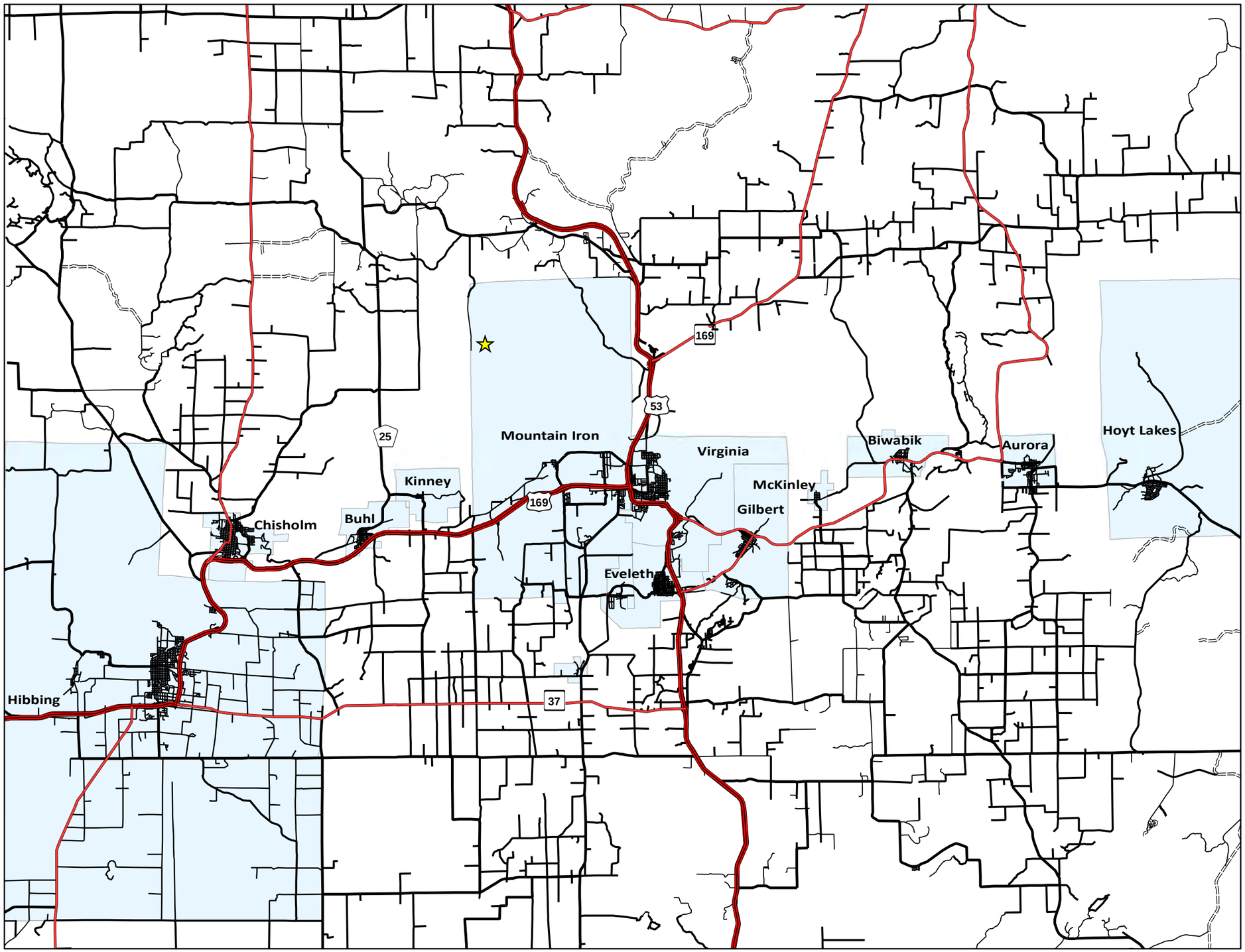
APPENDIX A

FIGURES



N

0 10,000 20,000 40,000

Feet

1 inch = 20,000 feet

Legend

☆ Project Location

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1	Original Issue	SRP	27 Mar 2014	ARD	27 Mar 2014

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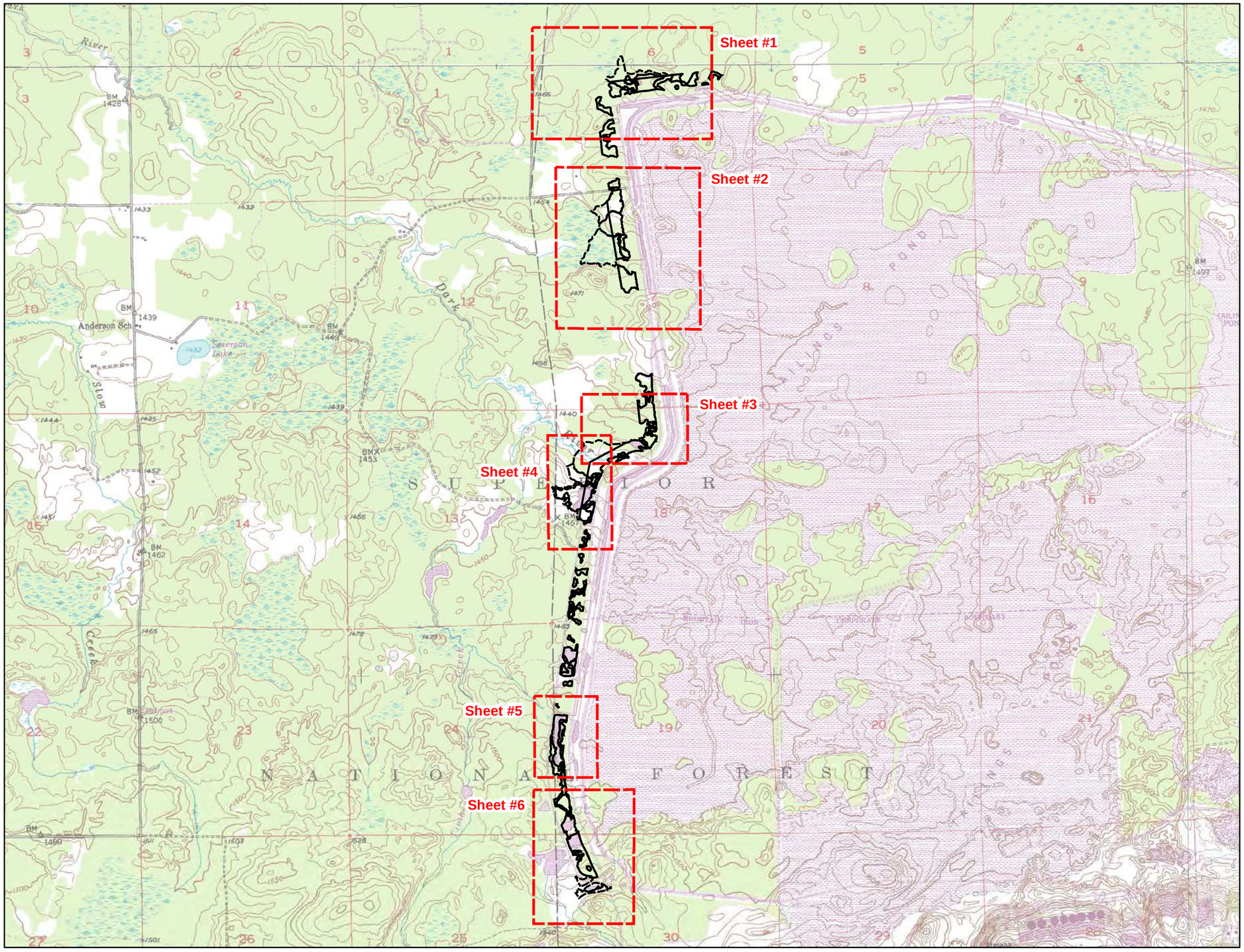
Mt. Iron, Minnesota (St. Louis)

Figure 1
Project Location Map

NTS Project #: **7892P**

Date: **27 Mar 2014**

1



Reference: USGS Topographic Maps

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Figure 2
Project Area Map

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2

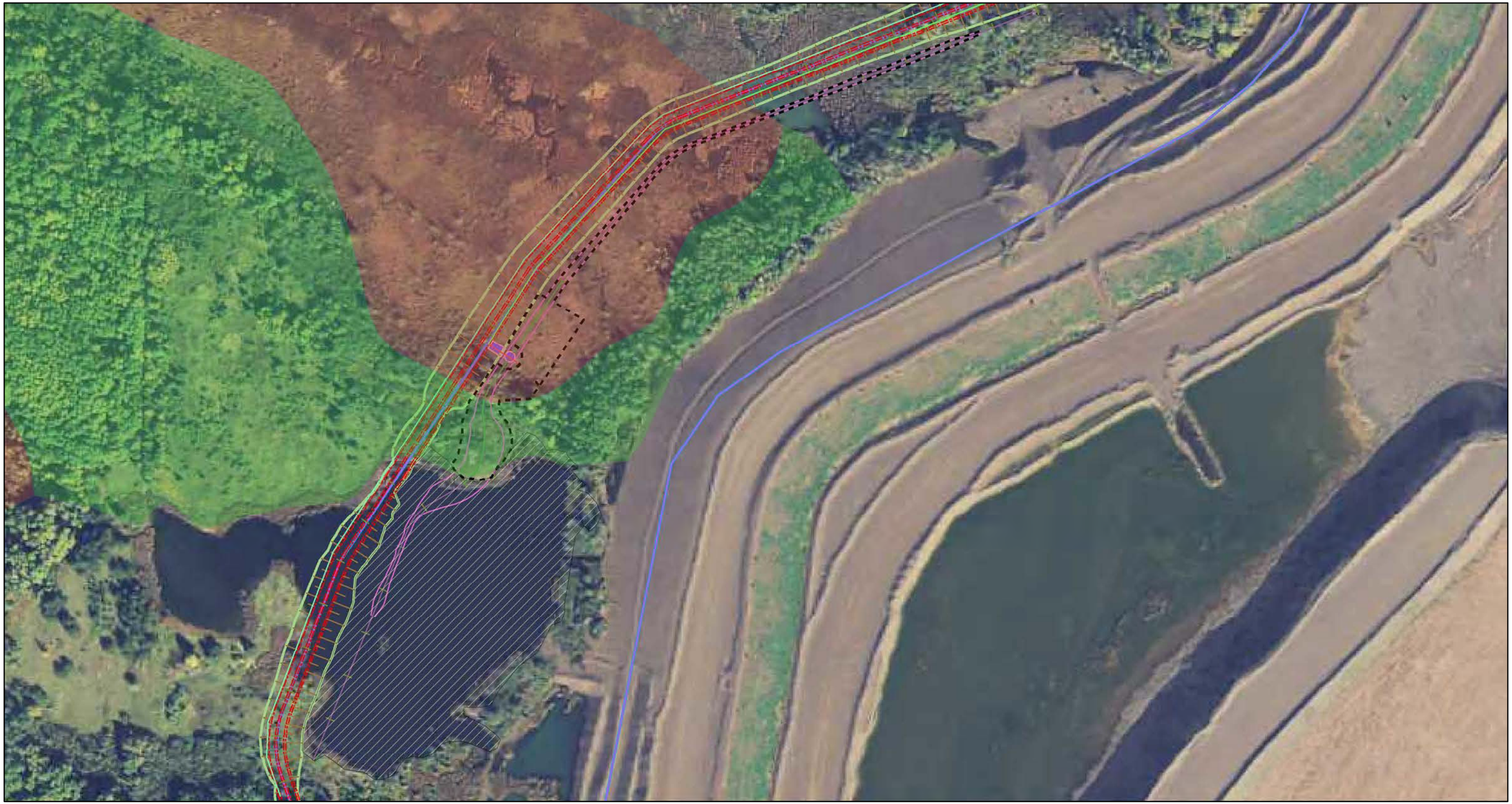

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Figure 3
French Drain Lateral Effect

Soils
- Bowstring
- Nashwauk

Drained Wetland Area

Lateral Effect of French Drain

N

0 100 200 400 Feet

Northeast Technical Services

N

0 125 250 500

Feet

1 inch = 250 feet

Legend

- Road Centerline
- Road Extent
- Pump Station
- Force Main

Seep Collection Direct Impacts

- Pump Station
- Road

- Wetland Boundary 2012
- Estimated Wetland Boundary 2014

Reference: ESRI World Imagery

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Figure 4
Wetland Impacts

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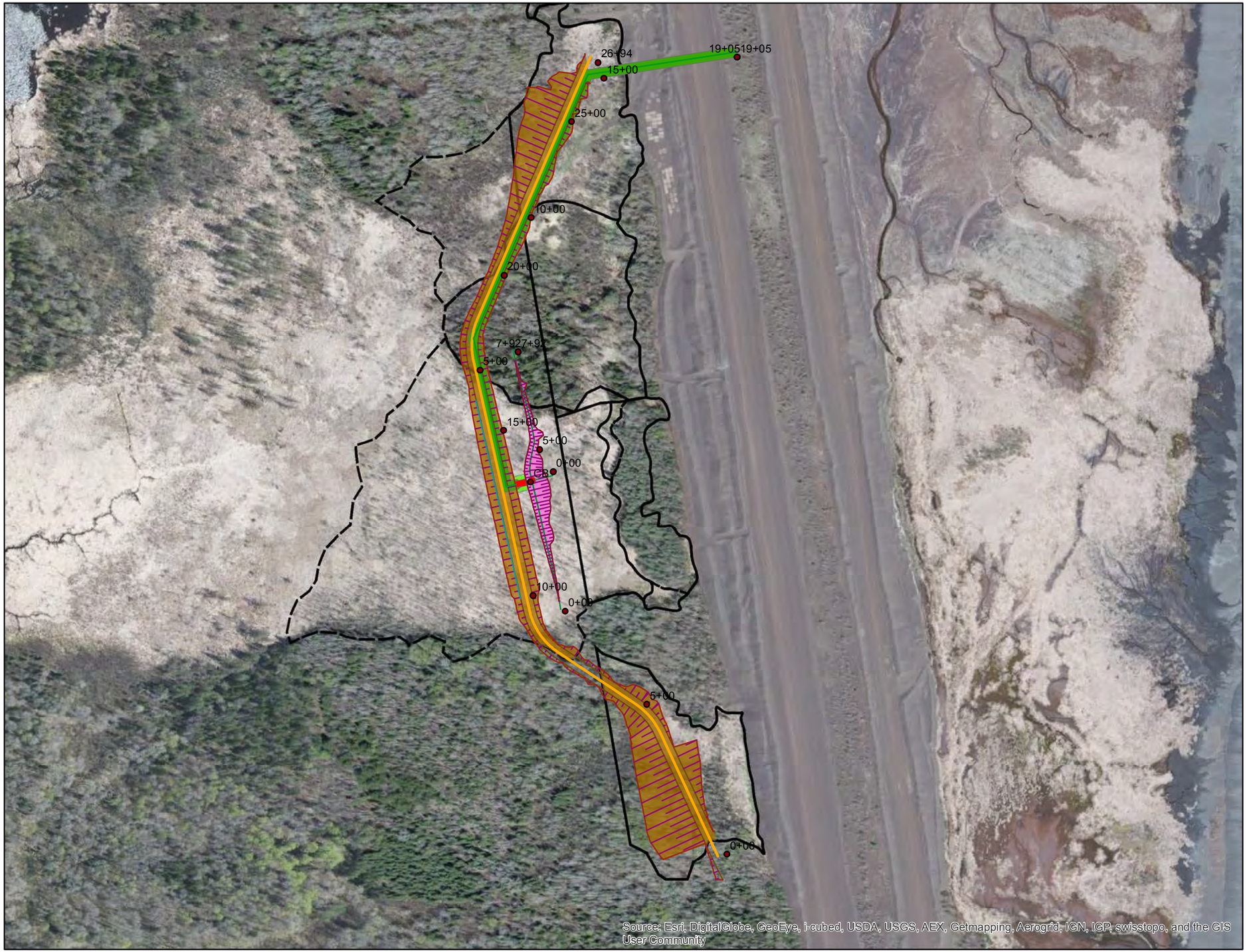
4



N

0 150 300 600

Feet

1 inch = 300 feet

Legend

- Road Centerline
- Pump Station
- Force Main

Seep Collection Direct Impacts

- Drainage Swale
- Pump Station
- Road

- Wetland Boundary 2012
- Estimated Wetland Boundary 2014

Reference: ESRI World Imagery

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Figure 5
Wetland Impacts

NTS Project #: **7892P**

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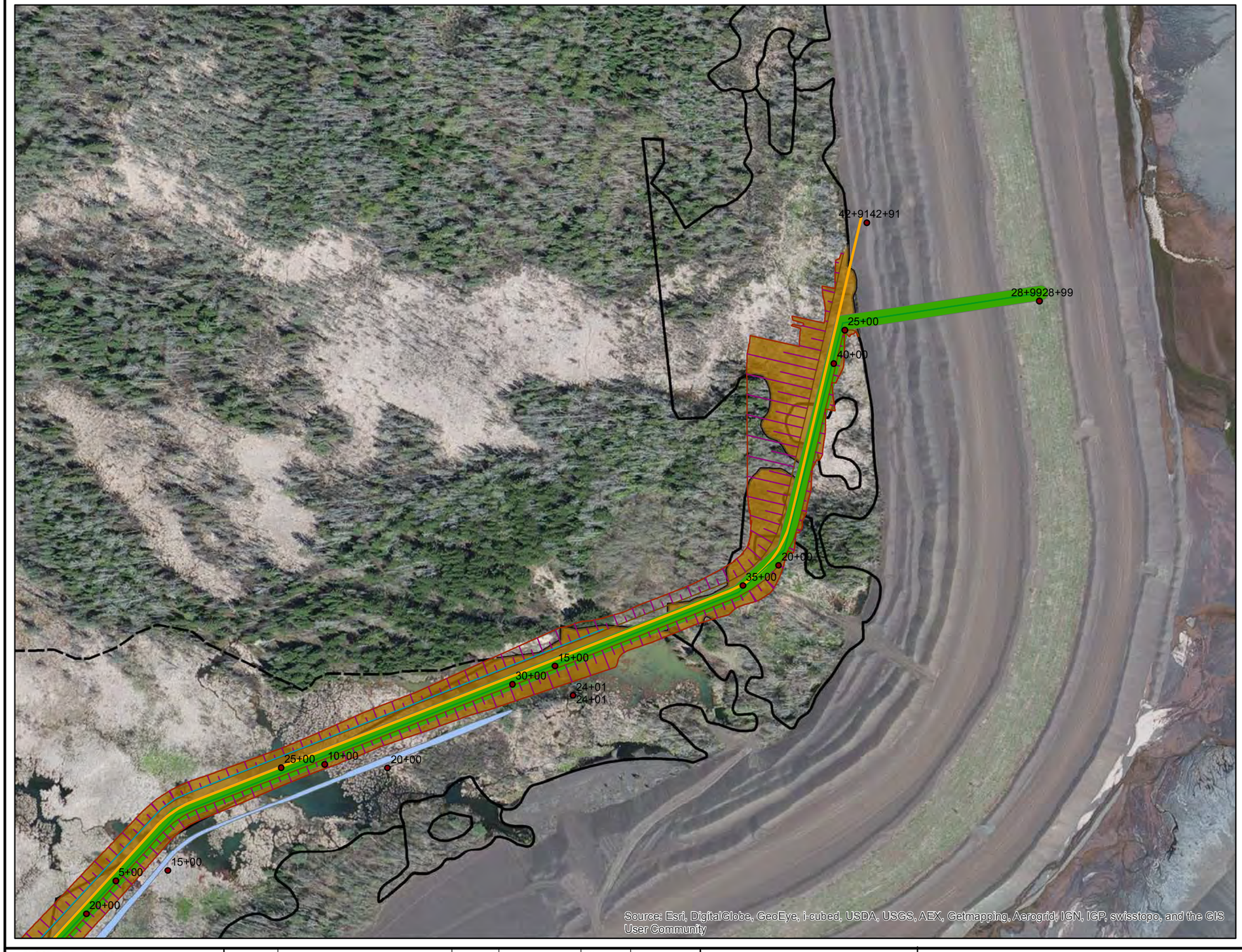
5



N

0 100 200 400

Feet

1 inch = 200 feet

Legend

- Road Centerline
- Force Main

Seep Collection Direct Impacts

- Road

Seep Collection Hydrologic Impacts

- French Drain
- Wetland Boundary 2012
- Estimated Wetland Boundary 2014

Reference: ESRI World Imagery

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Figure 6
Wetland Impacts

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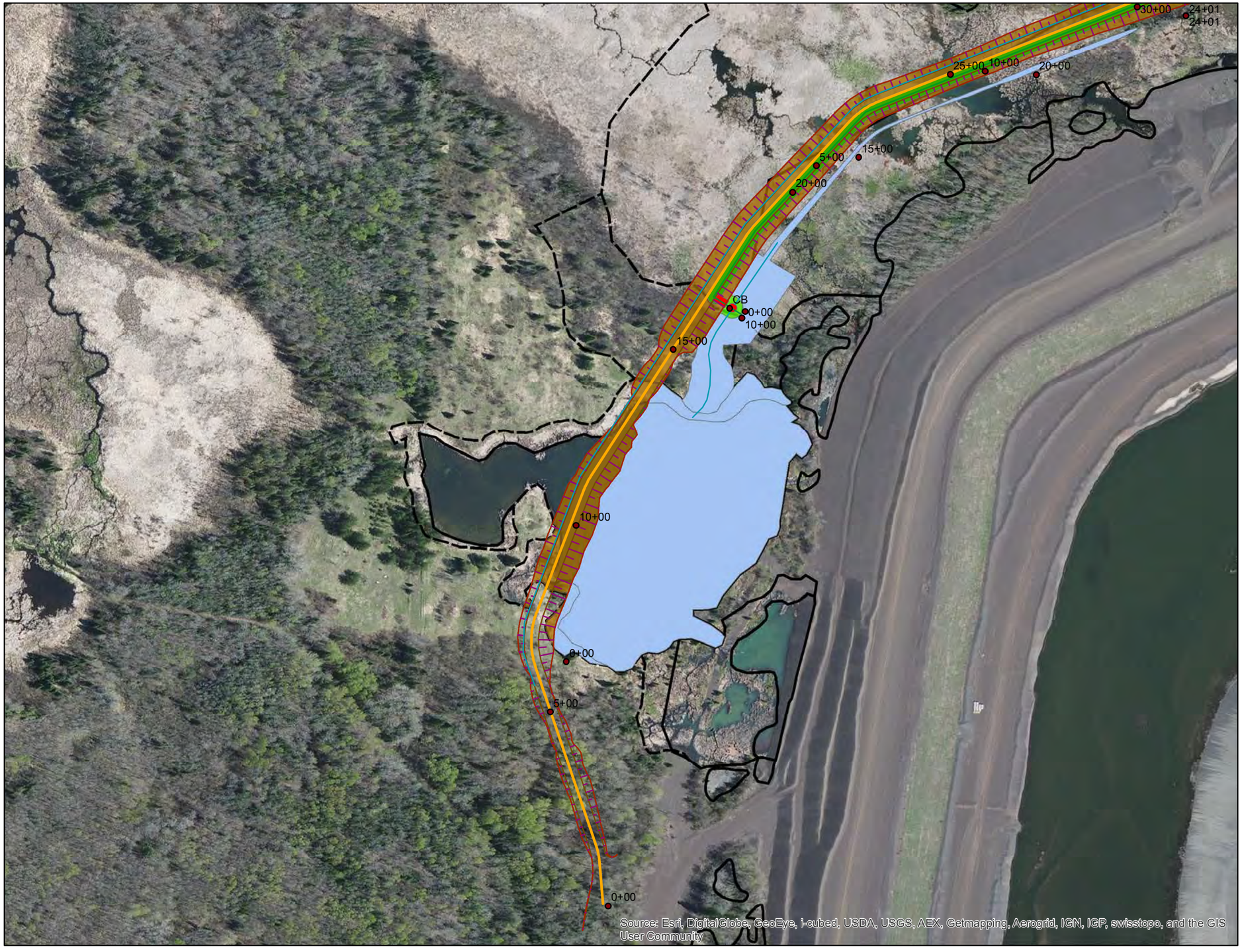
6



N

0 125 250 500

Feet

1 inch = 250 feet

Legend

- Road Centerline
- Pump Station
- Force Main

Seep Collection Direct Impacts

- Pump Station
- Road

Seep Collection Hydrologic Impacts

- French Drain
- Wetland Boundary 2012
- Estimated Wetland Boundary 2014

Reference: ESRI World Imagery

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Figure 7
Wetland Impacts

NTS Project #: **7892P**

Date: **27 Mar 2014**

7

N

0 100 200 400

Feet

1 inch = 200 feet

Legend

- Pump Station
- Force Main

Temporary Seep Collection

- Forcemain
- Wetland Boundary 2012
- Estimated Wetland Boundary 2014

Reference: ESRI World Imagery

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Figure 8
Wetland Impacts

NTS Project #: **7892P**

Date: **27 Mar 2014**

8

N

0 100 200 400

Feet

1 inch = 200 feet

Legend

Road Centerline

Seep Collection Direct Impacts

Road

Seep Collection Hydrologic Impacts

Culvert Outlet

Wetland Boundary 2012

Estimated Wetland Boundary 2014

Reference: ESRI World Imagery

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Figure 9
Wetland Impacts

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9

PART I: BASIC APPLICATION
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Minntac Western Seepage Collection Project

APPENDIX B

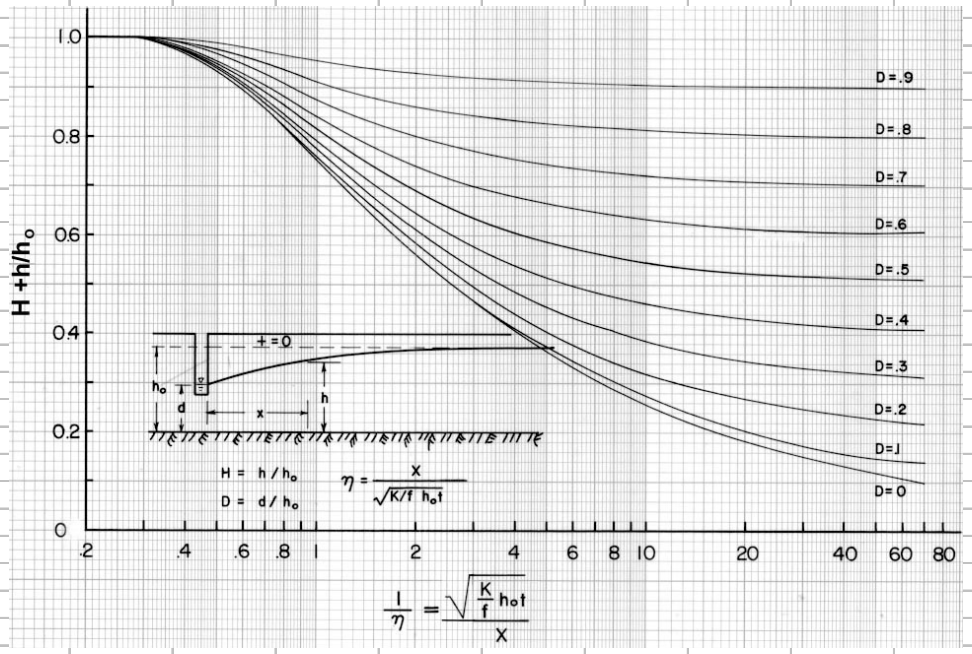
LATERAL EFFECT CALCULATIONS

Table 1
Results of Lateral Effect Calculations (Skaggs, 2005)

Soil Type	K (in/hr)	K (m/d)	f	t (d)	d (in)	d (m)	ho (in)	ho (m)	h (in)	h (m)	D	H	V	X (m)	X (ft)
Bowstring and fluvaquents	0.005	4.7232	0.11125	6.1	50	1.27	80	2.04	68	1.73	0.625	0.85	1	23.0	75
Keewautin-Nashwauk	0.001	1	0.2	6.1	36	0.92	60	1.53	48	1.22	0.6	0.8	1.3	5.3	17

K = hydraulic conductivity
f = drainable porosity
t = T_{25} = Time to reach a drawdown of 25 cm

h_o = initial thickness of aquifer
h = aquifer thickness at lateral effect distance, after drawdown
d = aquifer thickness at ditch, after drawdown
D = d/h_o
H = h/h_o
V = Value shown in Figure 5 of Skaggs (2005) (shown here)



Soils

1020A—Bowstring and Fluvaquents, loamy, 0 to 2 percent slopes, frequently flooded

Map Unit Setting
Elevation: 660 to 1,970 feet
Mean annual precipitation: 25 to 31 inches
Mean annual air temperature: 36 to 45 degrees F
Frost-free period: 80 to 140 days
Map Unit Composition
Bowstring, frequently flooded, and similar soils: 45 percent
Fluvaquents, frequently flooded, and similar soils: 45 percent
Minor components: 10 percent

Description of Fluvaquents, Frequently Flooded
Setting
Landform: Flats on flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium
Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Moderate (about 8.9 inches)
Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 7w
Hydrologic Soil Group: B/D
Other vegetative classification: Unnamed (G093AN024MN)
Typical profile
0 to 6 inches: Mucky silt loam
6 to 80 inches: Stratified silt loam to loamy coarse sand

Description of Bowstring, Frequently Flooded
Setting
Landform: Flats on flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Organic materials mixed with alluvium
Properties and qualities
Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 inches

Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Very high (about 21.0 inches)
Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 8w
Hydrologic Soil Group: A/D
Other vegetative classification: Unnamed (G093AN024MN)
Typical profile
0 to 38 inches: Muck
38 to 47 inches: Stratified fine sand to loamy fine sand
47 to 80 inches: Muck

A7B—Keewatin-Nashwauk complex, 0 to 8 percent slopes, stony
Map Unit Setting
Elevation: 1,280 to 1,610 feet
Mean annual precipitation: 26 to 28 inches
Mean annual air temperature: 37 to 39 degrees F
Frost-free period: 95 to 125 days
Map Unit Composition
Keewatin, stony, and similar soils: 45 percent
Nashwauk, stony, and similar soils: 35 percent
Minor components: 20 percent

Description of Keewatin, Stony
Setting
Landform: End moraines, drumlins, till plains
Landform position (two-dimensional): Toeslope, footslope, summit
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy dense till
Properties and qualities
Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: 40 to 60 inches to densic material
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 6 percent
Available water capacity: Moderate (about 8.0 inches)
Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 3w
Hydrologic Soil Group: C/D
Other vegetative classification: Unnamed (G057XN020MN)

Typical profile
0 to 4 inches: Loam
4 to 12 inches: Loam
12 to 17 inches: Sandy loam
17 to 34 inches: Clay loam
34 to 58 inches: Clay loam
58 to 80 inches: Loam

Description of Nashwauk, Stony
Setting
Landform: End moraines, drumlins, till plains
Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Loamy dense till
Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: 40 to 60 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 6 percent
Available water capacity: Moderate (about 7.9 inches)
Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: C/D
Other vegetative classification: Unnamed (G057XN019MN)
Typical profile
0 to 3 inches: Loam
3 to 10 inches: Fine sandy loam
10 to 13 inches: Fine sandy loam
13 to 26 inches: Clay loam
26 to 57 inches: Clay loam
57 to 80 inches: Loam

References

Skaggs, R.W., G.M. Chescheir, B.D. Phillips, 2005. "Methods to determine Lateral Effect of a Drainage Ditch on Wetland Hydrology." Transactions of the ASAE. Volume 48(2): 577-584.

USDA, 2014. Web Soil Survey. http://websoilsurvey.sc.egov.usda.gov

PART I: BASIC APPLICATION
Additional Information
U.S. Steel Corporation – Minnesota Ore Operations
Minntac Western Seepage Collection Project

APPENDIX C

Phase II Report and Plans

U. S. Steel Corporation - Minnesota Ore Operations
Minntac Western Seepage Collection System

Phase 2 Report

03/14/2014	C	Client Review	W Chan	A Trollope	D Johnson	R Wilmunen
05/06/2013	B	Client Review	W Chan	A Touhidi	D Johnson	R Wilmunen
05/01/2013	A	Internal Review	W Chan	A Touhidi	D Johnson	
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**	**Approved By**
			HATCH			**Client**

Safety • Quality • Sustainability • Innovation

Table of Contents

1. Introduction

Hatch was commissioned by United States Steel Corporation (USS) to carry out the conceptual design for the Western Seepage Collection System of the Minntac Tailings Storage Facility (TSF). The Western Seepage Collection system is proposed as part of the renewal of the National Pollutant Discharge Elimination System (NPDES) permit for Minntac.

The Phase 2 Report presents a summary of the work completed for the proposed seepage collection system.

2. References

- AECOM, December 2009. “FEL 3 Submittal – Minntac Seepage Collection System Design Report”.
- Hatch, April 2013. “United States Steel Corporation – Minntac Western Seepage Collection Basis of Design - Civil”, Document No. H339306-0000-10-109-0003.
- Hatch, April 2012. “United States Steel Corporation – Minntac Western Seepage Collection Phase 2 Report”, Document No. H339306-0000-90-124-0001.
- Hatch, December 2011, “United States Steel Corporation - Minntac Western Seepage Collection Conceptual Options Study Report”, Document No. H339306-0000-10-124-0001.
- Hatch, December 2011, “2011 Geotechnical Investigation Report” Document No. H339306-0000-15-124-0001 submitted to United States Steel Corporation.
- U. S. Steel Minntac, December 2012. “West Tailings Basin Surface Seepage Survey”.

3. Background

The Minntac facility is located near the town of Mountain Iron, Minnesota. The Minntac tailings basin is approximately 8,000 acres in size and consists of a perimeter dam and internal fine-tailings cells separated by coarse tailings dikes. The seepage from the basin has been found to have elevated levels of certain constituents (e.g., hardness, total dissolved solids, specific conductance and possibly sulfate), which are currently not in compliance with the existing Minnesota surface water quality standards.

As required by a June 9, 2011 Schedule of Compliance agreement entered into between USS and the Minnesota Pollution Control Agency, USS and Hatch have evaluated the feasibility of installing a surface seepage collection and return system along the western perimeter of the tailings basin perimeter dike at Minntac. This proposed seepage collection system is similar in nature to the seepage collection and return system previously installed on the eastern perimeter of the TSF. This eastern system became fully operational in June 2011; it used collection swales, catch basins and pumping wells to return the collected seepage water along the eastern perimeter back to the TSF.

Two previous studies have been conducted for the Western Seepage Collection System. These studies consisted of a Phase 1 Study and a Phase 2 Design. The Phase 1 Study of the Western Seepage Collection System (Hatch document H339306-0000-10-124-0001) evaluated various options while taking into consideration some of the key technical and construction risks identified during the installation of the eastern system. These include: difficulties installing the storm water conduit by means of directional drilling due to ground conditions and the inability to hydraulically connect the catch basins. The revised options were then assessed based on a list of criteria which included technical feasibility and the minimization of down gradient environmental impacts. The french drain and/or swale conveyance options were recommended mainly due to their improvements over the methodologies used in the construction of the eastern seepage collection system. These improvements include open cut construction instead of directional drilling to minimize potential construction issues and the use of access roads as a base for the installation of the sheet piles. All collected seepage water will be conveyed to pump stations for return back to the TSF.

The Phase 2 Design (Hatch document H339306-0000-90-124-0001) included additional engineering design and refinement of the recommended option presented in the Phase 1 study.

Subsequent to the Phase 2 Design report, USS conducted a site investigation where seepage areas were located and measurements of seepage rates were mad. Based upon this information USS has requested Hatch to revisit the seepage collection system design with the additional objective of reducing the impact to the adjoining wetlands by specifically targeting the seepage areas. The seepage collection system is to be designed to manage the surface seepage in the specific areas as identified by USS during a site investigation conducted in 2012. This report presents the findings of the additional study conducted to reduce wetland impacts.

4. Scope of Work

The scope of work for this study includes:

- Preparation of a Basis of Design.
- Preliminary engineering of a new design concept to reduce wetland impact by utilizing existing infrastructure, targeting specific seepage areas and isolating downstream wetlands by installation of sheet pile barriers.

5. Design Basis

The basis of design for the civil design aspects of the western seepage collection system is outlined in Hatch document H339306-0000-10-109-0003. The following sections provide a summary of the basis of the design:

5.1 Seepage Location and Flow Rates

USS completed a surface seepage survey in 2012 and provided Hatch with the seep points at which the collection of seepage is required. The locations and measured flow rates are presented in Table 5-5.1 and shown in Figure 5-1.

Table 5-5.1 - Observed Seep Location and Measured Flow Rates

Seep Point	Location Coordinates*		Measured Flow (gpm)
A	15,789.611	-16,793.702	57.7
B	17,587.810	-16,554.610	10.8
C	11,704.567	-15,738.228	603.2
1	21,153.456	-16,018.758	27.9
2	22,042.807	-15,679.247	204.1
3	22,570.900	-15,044.560	416.3
4	22,799.087	-14,619.613	98.7
7	27,481.470	-15,129.004	30.7
8	28,040.241	-15,210.393	43.1
13	31,582.326	-15,083.452	159.9

*Coordinates are in local Minntac coordinates system.

This data, as provided by USS, is considered to represent the total seepage from the western perimeter of the tailings basin. The seepage collection system will be specifically designed for these seepage locations and will account for these flows.

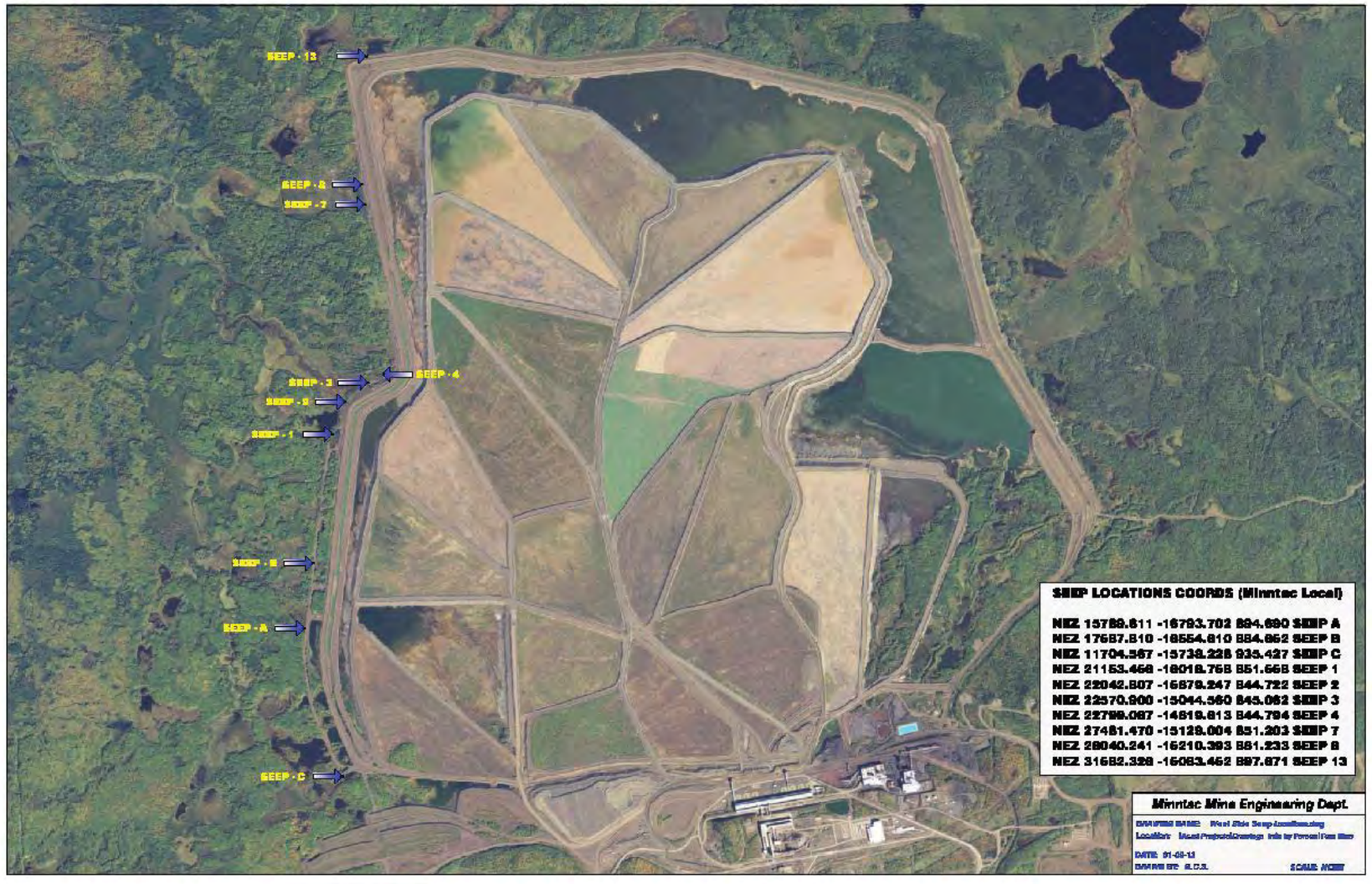


Figure 5-1 - Seepage Locations

5.2 Geotechnical Conditions

The Geotechnical Investigation Report (Hatch document H339306-0000-15-124-0001), provides information on the project site's geotechnical conditions. In general, the site's general stratigraphy consists of coarse tailings over a layer of clay, underlain by fine sand and gravel (alluvium) and silty sand with gravel and clay (glacial till) which overlies the bedrock. Boulders were frequently encountered within the alluvium and glacial till units.

Bedrock is comprised of medium to coarse grained pink granite. The bedrock is slightly weathered near the soil/bedrock interface. Bedrock was encountered at approximately 16.5 ft in one borehole (BH2) located in the northern section of the project limits. However, bedrock was not encountered in other boreholes that were generally extended to 60 feet. In places the bedrock is expected to occur at depths in excess of 60 feet from the existing ground surface.

5.3 Design Parameters

The design parameters that will be incorporated into the design are presented in Table 5.2.

Table 5.2 - Design Parameters

Description	Unit	Value	Comments
Minimum channel slope	%	0.5	To maintain flow of water within the channel
Minimum channel side slope		2H:1V	
Minimum Width of Service Road	ft	25	Including barriers
Design Storm Event			
Return Period	Year	100	
Duration	Hour	24	
Rainfall	in	5.9	NOAA (1961)
Frost Depth	ft	5	MSBC

6. Design Concept

The objective of the seepage collection system is to collect surface seepage from the specific areas identified by USS and return the collected water to the tailings basin. As surveyed by USS in December 2012, there are ten surface seepage locations along the western perimeter of the Minntac tailings basin. These ten seepage locations are presented in Section 5.1.

The design concept consists of a series of access roadways, collection swales, french drains, culverts and controlled surficial flow that conveys seepage and local runoff into catch basins where it is collected and pumped to the TSF. The western seepage collection system has been divided into four catchment areas and the selection of the collection method (swale, french drain) is largely dependent on the local topography. The collection swales or french drains are to be longitudinally graded to convey collected surface seepage water to a catch basins. The seepage water collected in the catch basins will be conveyed to pump stations and returned to the tailings basin by pumping. Based on the seep locations and local topography, it was determined that four pump stations would be required.

This design also includes wetland separation measures to reduce the impact of the surface seepage collection system to the adjacent wetland.

As the seepage collection system involves installation of infrastructure that will require regular maintenance during its operating life, it is recommended that access roads be constructed in order to provide maintenance access to the catch basins and pump stations. There are opportunities to sequence the construction schedule so that the access roads can be utilized during construction of the seepage collection system by providing construction equipment access to the proposed work sites.

Drawings H339306-M-G-601 to H339306-M-G-608 illustrate the design.

6.1 Seepage Collection System

The seepage collection system design consists of a number of seepage conveyance and storage elements that will be applied to the individual seepage catchment areas depending on the needs of each catchment. The following sections detail the systems that will be employed.

6.1.1 French Drain

The french drain construction will consist of the excavation to grade of the section followed by the placement of filter material, gravel fill and the installation of a 12 inch diameter perforated pipe. This will then be backfilled with a layer of gravel fill to a pre-determined depth over the perforated pipe. Rock fill will then be used to backfill the trench to it final finished grade. The side slope of the excavated section will be 2H:1V to maintain stability of the excavation. The french drain will have a longitudinal slope of 0.5% as a minimum to promote water flow towards the catch basin (Drawing No. 339306-M-G-615).

An excavation is required to install the french drain. The proposed design places the french drain 50ft away from the existing tailings dam toe to minimize any potential impact to the stability of the existing tailings dike. Monitoring instrumentations will be installed in the existing tailings dike in order to monitor the tailings dike during construction. This is to make sure that the stability of the dike is not jeopardized. Details of monitoring instrumentations will be provided in a future phase.

6.1.2 Collection Swales

The natural topography of the area allows grading of the existing ground surface to form collection swales to transport collected surface seepage water to the catch basins. The catch basin will be connected to a sump pump to return any collected water to the TSF. The collection swale will have 0.5% longitudinal slope as a minimum to convey collected water into the catch basins. The side slopes will be graded at 5H:1V as a maximum to promote surface seepage towards the collection swales while not impacting the overall slope stability of the tailings dikes.

As the areas for the swale excavation are currently vegetated, the ground will need to be stripped of topsoil and any organics to expose the subgrade. The excavated material will be disposed at a suitable location. Coarse tailings available at Minntac will be placed over the excavated areas and compacted in place to finished grade for erosion protection

6.1.3 Catch Basins and Pump Stations

Seepage water collected in the collection swales and french drain will be routed to catch basins situated at low points determined based on local topography. The seepage water collected in the catch basins will be conveyed to pump stations and pumped to the tailings basin. According to available topographic data, four catch basins and four pump stations will be required (Drawing No. H339306-M-G-601).

6.1.3.1 *Catch Basins*

In areas where a collection swale or french drain is used (Catchments 2 and 3), the rims of the catch basin will be levelled to the surrounding ground to smooth, undisturbed flow to enter the system. The perforated pipe of the french drain will be hydraulically connected to the concrete catch basin to convey the collected seepage water (Drawing No. H339306-M-G-615).

Each catch basin will be equipped with a two feet deep sump to allow further settling of solids to prevent solids from entering the pumping system. The sumps will require clean-out periodically as solids accumulate.

It is anticipated that water will pond within the catch basins and the isolated catchment areas under design storm conditions. During such events the access road and wetland separation measures will function as containment to prevent the downstream release of any collected water. Pumps will be sized to recover the impounded storm water runoff volume over a one week period to achieve balance between normal and design storm conditions.

6.1.3.2 *Pump Stations*

A pump station equipped with two (2) submersible pumps will be installed adjacent to each catch basin. The pumps will be installed in the catch basins. The seepage water will then be returned to the tailings basin by pumping (Drawing No. H339306-M-G-615).

The pump and return line sizing for each catchment area is presented in Table 6.1 below. The flow rates have been developed based on the measured seepage rates within each catchment and the 1:100 year 24-hour design storm event to be recovered over a one week period.

Table 6.1: Pump and Return Line Sizing

Catchment	Flow Rate (GPM)	Pump Size (hp)	No. Of Pumps	Return Line HDPE – DR17 (in)
1	3600	50	2	18
2	1200	40	2	10
3	300	25	2	4
4	300	25	2	4

6.1.4 Access Road

Access roads will be required to facilitate construction traffic and future maintenance traffic. The construction of access roads will serve several functions that include: access to construction areas, platforms to facilitate the installation of wetland separation measures and maintenance access during operations. An existing access road in the southern section will be utilized to the maximum extent practicable and new access roads will be constructed only for areas not currently serviced by the existing access roadway.

The embankment crest of the access road will be approximately 30ft wide in order to accommodate construction traffic. The access road will be constructed using waste rock and coarse tailings that are readily available from Minntac. Two windows, 4ft. in height, will be constructed on the access roads to act as barriers for vehicles. Details of the proposed access road are shown on Drawing No. 339306-M-G-615.

6.1.5 Wetland Separation Measures

Wetland separation measures will be required to minimize the impact of the surface seepage collection system on the wetland adjacent to the tailings basin. These measures will be installed at specific locations in order to prevent dewatering of the wetland adjacent to the seepage collection system. The wetland separation measure provides protection of the adjacent wetland by creating separation for surface water and also acts as protection of the seepage collection system to prevent it from being overwhelmed by the adjacent wetland.

The wetland separation measure, currently under consideration is comprised of a series of steel sheet piles that will be installed to sufficient depths to create a seepage barrier between the wetland and the seepage collection system. The sheet pile barrier will minimize seepage from the adjacent wetland to the seepage collection system while not obstructing the naturally occurring groundwater flow. Similar systems have been implemented successfully along the eastern perimeter of the tailings basin.

The sheet piles will be installed through the access road to ensure the installation equipment will have access to the areas where the sheet piles will be installed. The wetland separation measure will be installed prior to construction of collection swales, french drain and catch basins to ensure that the working areas can be adequately dewatered prior to commencement of earthwork operations.

6.2 Catchment Areas

The western seepage collection system is divided into four catchment areas where seepage from the TSF will be collected and returned to the TSF. The following sections outline the design concept adopted for each of the catchment areas. The catchment areas are shown on Drawing H339306-M-G-601.

6.2.1 Catchment 1

Catchment 1 will capture the seepage and surficial flow from Seep Points A and C and pump the collected water into the TSF. Culverts will be constructed to route surficial flow observed at Seep Point C into the pond between the existing access road and the TSF embankment. Minor grading within the pond by means of dredging may be required to ensure the flow will be directed into the catch basin which is located near Seep Point A, at the northern end of the pond.

Preliminary calculations have estimated that with minor grading, the existing ponds within Catchment 1 will have sufficient storage volume to manage the design storm event (100yr - 24hr) to allow for reclamation of the storage volume via pumping. Due to the large catchment area, approximately 275 acres, a one-week period has been allowed to evacuate the design storm water runoff. Two 50 horse-power pumps capable of pumping 1800 gpm, to a total of 3600 gpm will be installed at Pump Station 1 within Catchment 1. It is anticipated that one pump will be used for normal operation with the second pump being utilized under storm conditions.

Wetland separation measures in the form of sheet piles will be used to ensure the adjacent wetland is protected.

6.2.2 Catchment 2

Due to topographical restrictions, a french drain system will be implemented within Catchment 2. The french drain will be hydraulically connected to a catch basin where the collected water will then be pumped back into the TSF via two 40 horse-power pumps. Similar to Catchment 1, a one-week period is allowed for evacuation of any collected storm water. It is anticipated that one pump will be used for normal operation with the second pump being utilized under storm conditions.

Wetland separation measures in form of sheet piles will be used to ensure the adjacent wetland is protected.

6.2.3 *Catchment 3*

A collection swale will be constructed within Catchment 3 to encourage surface seepage to drain into the catch basin. Collected water within the catch basin will be pumped back into the TSF by two 25 horsepower pumps, accounting for a one-week to withdraw storm water from the catchment. It is anticipated that one pump will be used for normal operation with the second pump being utilized under storm conditions.

Wetland separation measures in form of sheet piles will be used to ensure the adjacent wetland is protected.

6.2.4 *Catchment 4*

Similar to Catchment 1, surficial flow will be collected within a catch basin by gravity and the water will be returned to the TSF via pumping. An access road will be constructed west of an existing pond to facilitate the installation of sheet piles which will serve as wetland separation.

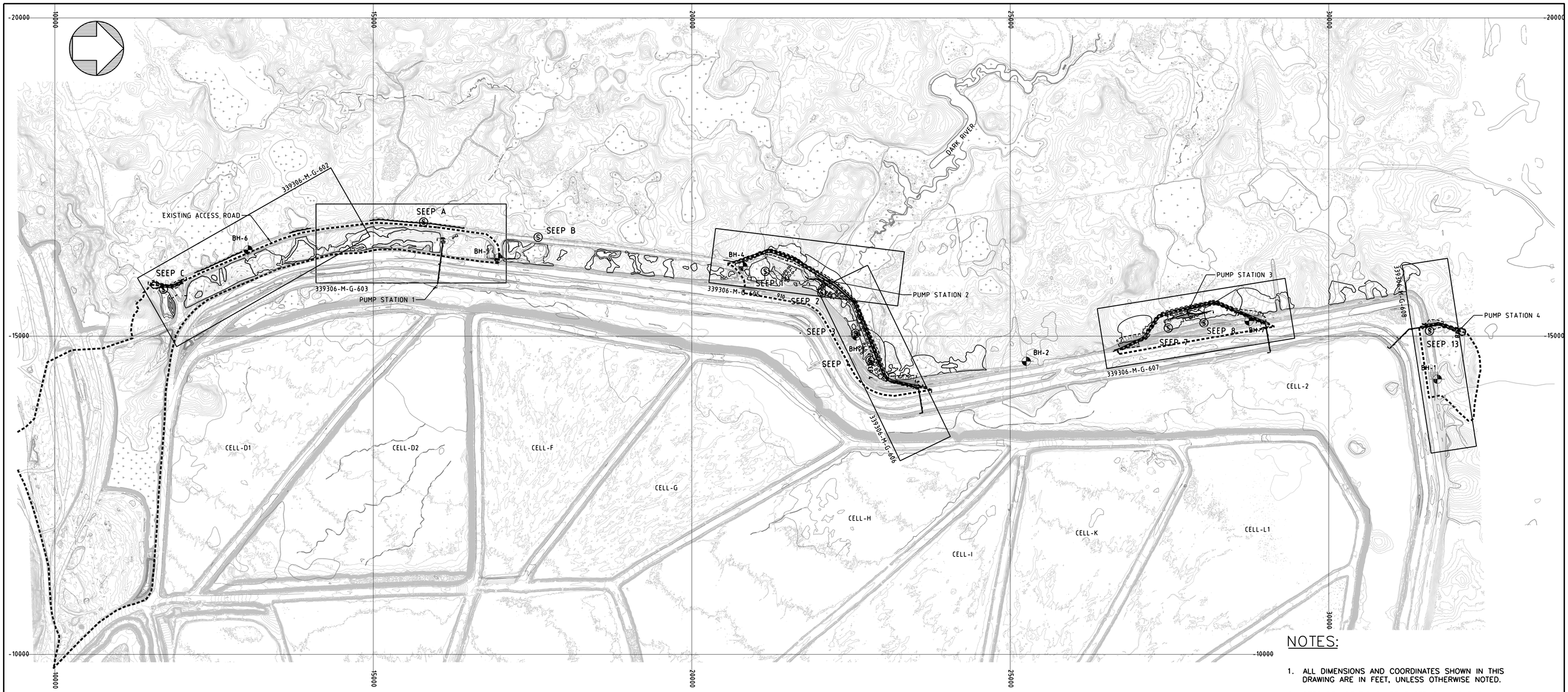
The catch basin will be equipped with two 25 horse-power pumps to return any collected water to the TSF. It is anticipated that one pump will be used for normal operation with the second pump being utilized under storm conditions.

7. Summary

The proposed seepage collection system is designed to manage the surface seepage in the specific areas identified by USS. The design includes wetlands separation measures to reduce the impact on the adjoining wetlands.

The design concept consists of collection swales, french drains and overflow pipes that will collect and convey surface seepage into catch basins. The seepage water collected in the catch basins will be conveyed to pump stations. The seepage water would then be returned to the tailings basin by pumping. Based on the seep locations and local topography, it was determined that four catch basins and four pump stations would be required.

Appendix A



TOPOGRAPHICAL LEGEND

- 810 — CONTOUR LINE
- EXISTING ROAD
- POWER (HYDRO) POLE
- CATCHMENT AREA
- WET LANDS
- TREE LINE
- SWAMP/MARSH
- NATURAL PIT
- TRIBUTARY LINE

LINE LEGEND

- FM—FM — FORCEMAIN
- ST—ST — SEEPAGE COLLECTION PIPE
- SHEET PILE LINE

GEOTECHNICAL SYMBOLS

- (S) — SURVEYED SEEPAGE LOCATION
- BOREHOLE (2011)

WATER SYSTEM SYMBOLS

- (CB) — CATCH BASIN
- PUMP HOUSE

CATCHMENT No.	CATCHMENT AREA (ft^2)	IMPACTED WETLAND AREA (ft^2)
1	11,264,825	0
2	1,733,333	824,838
3	843,427	247,684
4	1,003,626	0
TOTAL	14,845,211	1,072,552

PROFILE LEGEND

PVI	POINT OF VERTICAL INTERSECTION
PVC	POINT OF VERTICAL CURVATURE
PVT	POINT OF VERTICAL TANGENCY
L	LENGTH
S	SLOPE

NOTES:

1. ALL DIMENSIONS AND COORDINATES SHOWN IN THIS DRAWING ARE IN FEET, UNLESS OTHERWISE NOTED.
2. SEEPAGE LOCATIONS ARE BASED ON A SURVEY CONDUCTED BY MINNTAC MINE ENGINEERING DEPARTMENT ON JANUARY 9, 2013.
3. POND BATHYMETRY HAS BEEN ASSUMED BASED ON PROJECTED 5H:1V SIDE SLOPE.
4. COORDINATES SHOWN IN THIS DRAWING ARE IN LOCAL GRID. TOPOGRAPHIC INFORMATION WAS BASED ON DRAWING FILE, "ALL LIDAR DATA 2 FT CONTOURS.DWG", PREPARED AND PROVIDED BY MINNESOTA GEOSPATIAL INFORMATION OFFICE (MnGEO), RECEIVED ON FEBRAURY 19, 2013.

FOR CLIENT REVIEW

0 250 500 1000
SCALE IN FEET

PROJECT NO. 339306

DESIGNED BY	WC	03/14/14
DRAWN BY	MSM	03/14/14
CHECKED BY	AT	03/14/14
APPROVED BY	DJ	03/14/14

NO.	DATE	REVISION
C	03/14/14	FOR CLIENT REVIEW
B	05/06/13	FOR CLIENT REVIEW
A	05/01/13	FOR INTERNAL REVIEW

MINNESOTA ORE OPERATIONS

DRAWN MSM DATE 03/14/14
CHECKED AT DATE 03/14/14
SCALE AS SHOWN

WESTERN TAILINGS BASIN SURFACE SEEPAGE COLLECTION STUDY

GENERAL ARRANGEMENT AND BOREHOLE LOCATION PLAN

DISK NO.
DWG. NO. 339306-M-G-601

INTERPRETED BATHYMETRY (NOTE 5)

SEEP C

PROPOSED GRADING

PROPOSED CSP CULVERT

20% GRADE

SHEETPILE

EXISTING ACCESS ROAD

OUTER ROAD

MATCH LINE SEE DWG. NO. 339306-M-G-603

PLAN

NOTES:

1. ALL DIMENSIONS AND COORDINATES SHOWN IN THIS DRAWING ARE IN FEET, UNLESS OTHERWISE NOTED.
2. SEEPAGE LOCATIONS ARE BASED ON A SURVEY CONDUCTED BY MINNTAC MINE ENGINEERING DEPARTMENT ON JANUARY 9, 2013.
3. POND WATER LEVEL ELEVATIONS ARE BASED ON A SURVEY CONDUCTED IN DECEMBER 2011.
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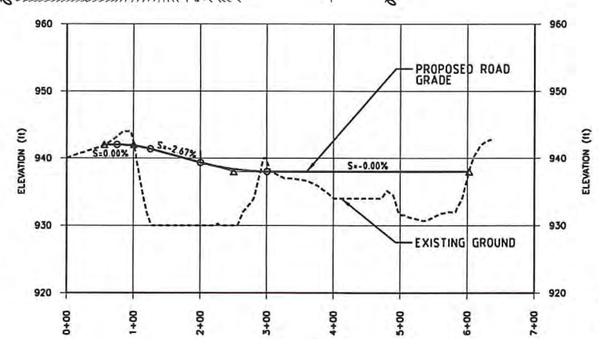
5. POND BATHYMETRY ARE BASED ON A PROJECTED 5H:1V SIDE SLOPE.



ACCESS ROAD PROFILE

FOR CLIENT REVIEW

HOR 0 50 100 200 SCALE IN FEET

VER 0 5 10 20 SCALE IN FEET

HATCH™ 1600 WEST CARSON STREET PITTSBURGH, PA 15219-1031 412-497-2000 www.hatch.ca

339306

DESIGNED	WC	03/14/14
DRAWN	MSM	03/14/14
CHECKED	AT	03/14/14
APPROVED	DJ	03/14/14

NO.	DATE	REVISION
C	03/14/14	FOR CLIENT REVIEW
B	05/06/13	FOR CLIENT REVIEW
A	05/01/13	FOR INTERNAL REVIEW

MINNESOTA ORE OPERATIONS

DRAWN MSM DATE 03/14/14

CHECKED AT DATE 03/14/14

SCALE AS SHOWN

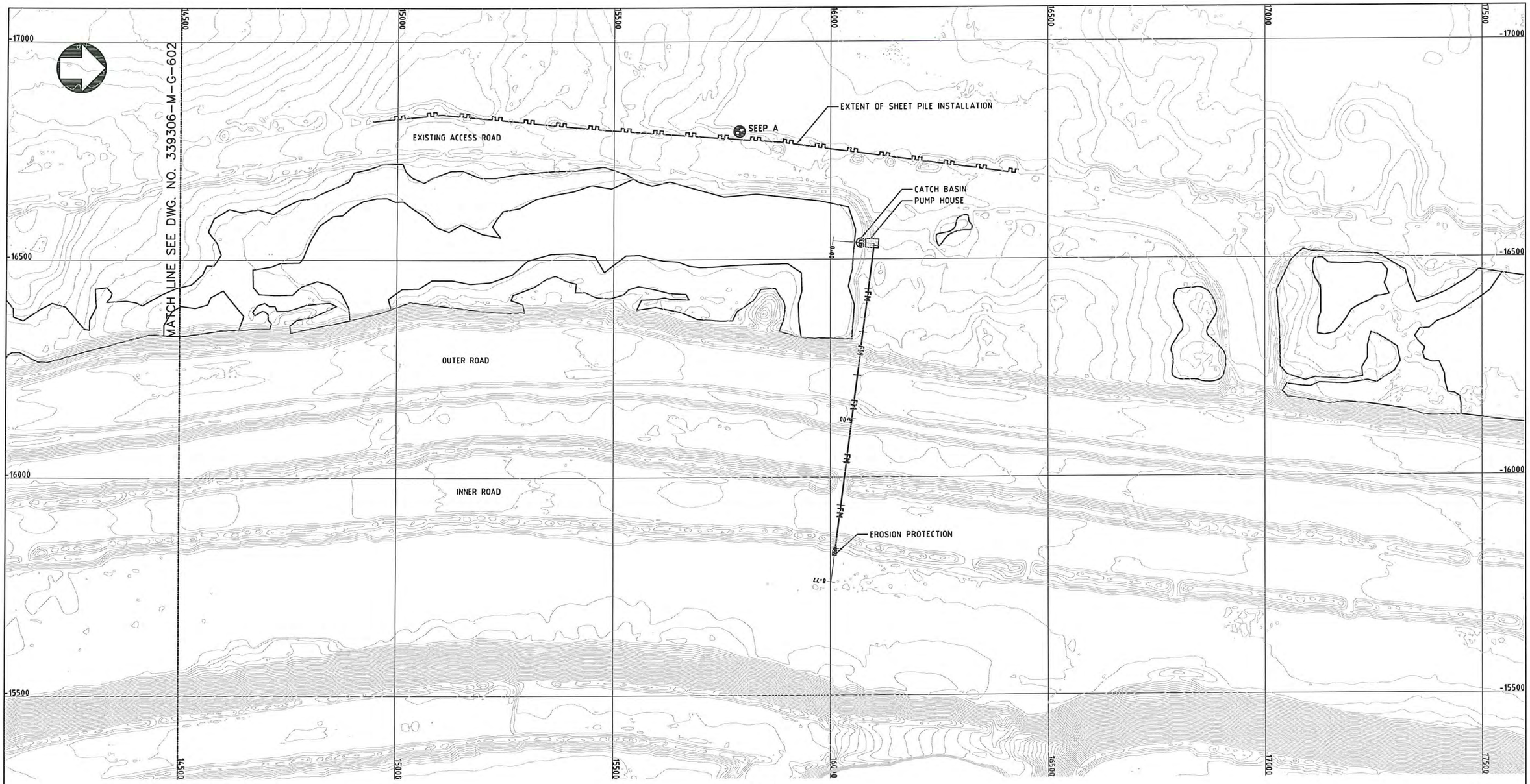
WESTERN TAILINGS BASIN SURFACE SEEPAGE COLLECTION STUDY

CATCHMENT 1

PLAN AND PROFILE (1 OF 2)

DISK NO.

DWG. NO. 339306-M-G-602



PLAN

NOTES:

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5. POND BATHYMETRY ARE BASED ON A PROJECTED 5H:1V SIDE SLOPE.

FOR CLIENT REVIEW

HOR 0 50 100 200 SCALE IN FEET

VER 0 5 10 20 SCALE IN FEET

HATCH™
1600 WEST CARSON STREET
PITTSBURGH, PA 15219-1031
412-497-2000 www.hatch.ca

ENGINEER	WC	03/14/14
DRAWN	MSM	03/14/14
CHECKED	AT	03/14/14
APPROVED	DJ	03/14/14

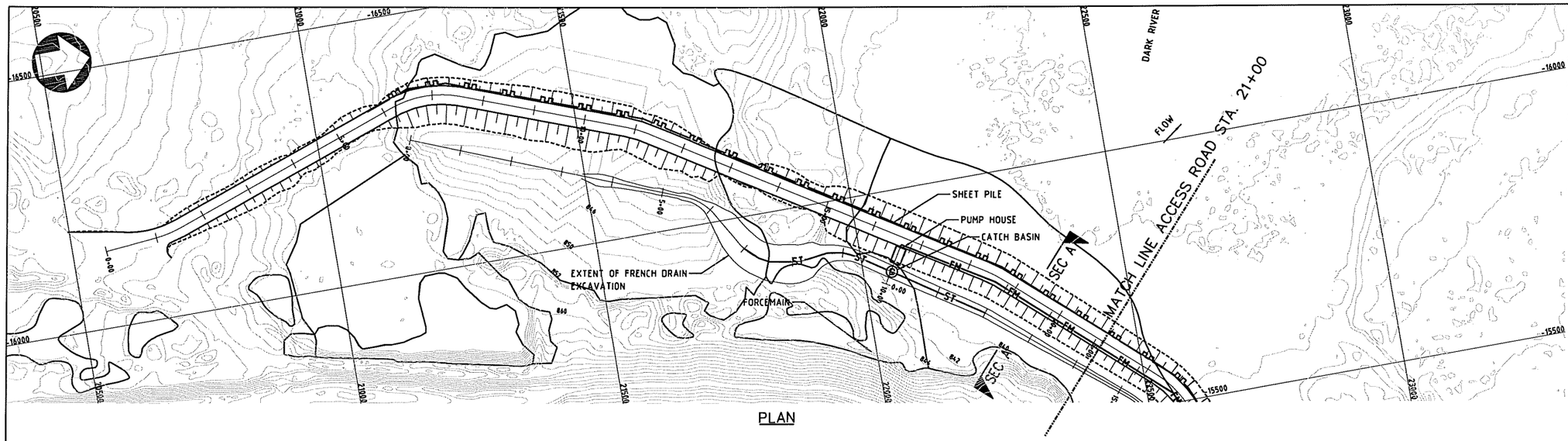
NO.	DATE	REVISION
C	03/14/14	FOR CLIENT REVIEW
B	05/06/13	FOR CLIENT REVIEW
A	05/01/13	FOR INTERNAL REVIEW

MINNESOTA ORE OPERATIONS

DRAWN MSM DATE 03/14/14
CHECKED AT DATE 03/14/14

WESTERN TAILINGS BASIN SURFACE SEEPAGE COLLECTION STUDY
CATCHMENT 1 (CONTINUED)
PLAN (2 OF 2)
SCALE AS SHOWN
DISK NO.
DWG. NO. 339306-M-G-603

339306



PLAN

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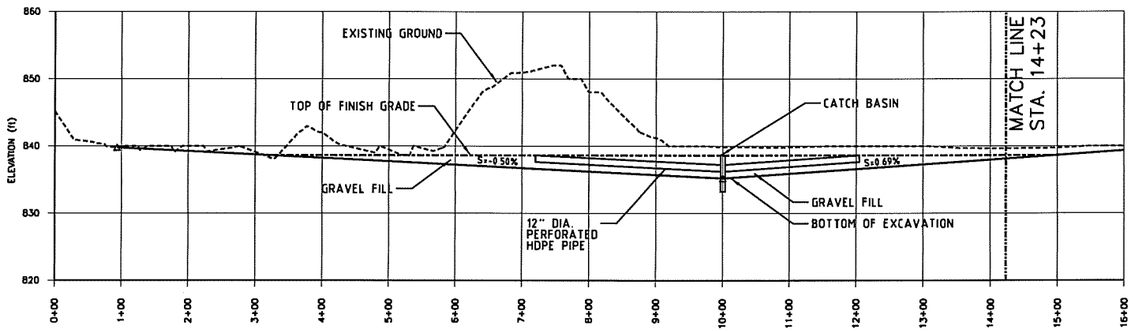
2. SEEPAGE LOCATIONS ARE BASED ON A SURVEY CONDUCTED BY MINNTAC MINE ENGINEERING DEPARTMENT ON JANUARY 9, 2013.
3. POND WATER LEVEL ELEVATIONS ARE BASED ON A SURVEY CONDUCTED IN DECEMBER 2011.
4. COORDINATES SHOWN IN THIS DRAWING ARE IN LOCAL GRID. TOPOGRAPHIC INFORMATION WAS BASED ON DRAWING FILE, "ALL LIDAR DATA 2 FT CONTOURS.DWG", PREPARED AND PROVIDED BY MINNESOTA GEOSPATIAL INFORMATION OFFICE (MnGEO), RECEIVED ON FEBRAURY 19, 2013.
5. POND BATHYMETRY ARE BASED ON A PROJECTED 5H:1V SIDE SLOPE.



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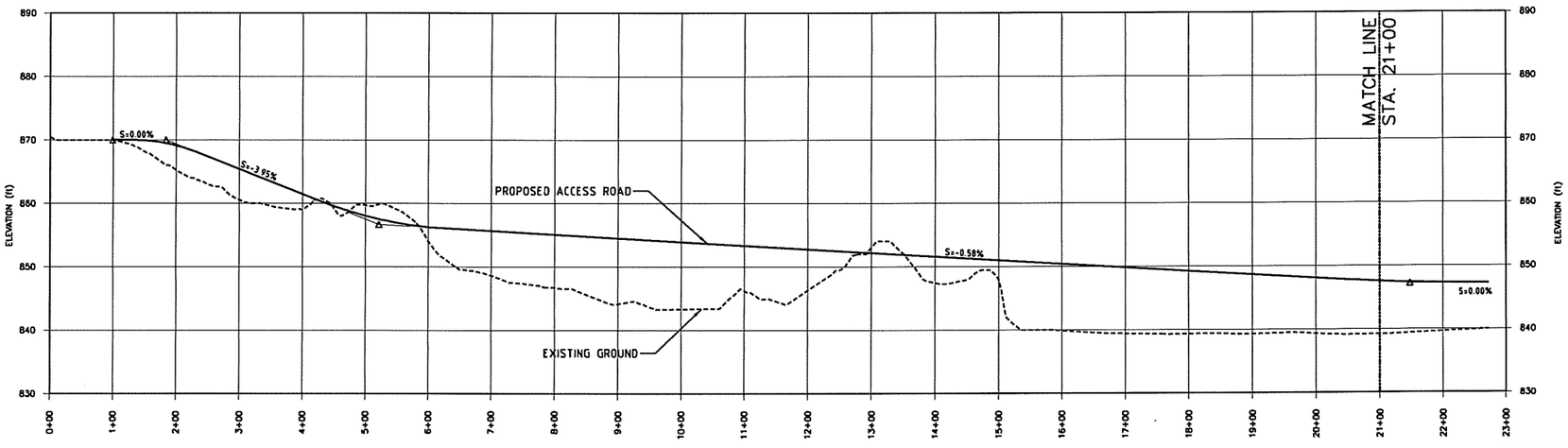

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VER 0 5 10 20 SCALE IN FEET

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339306 PROJECT NO.

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DRAWN BY	MSM	03/14/14
CHECKED BY	AT	03/14/14
APPROVED BY	DJ	03/14/14

NO.	DATE	REVISION
C	03/14/14	FOR CLIENT REVIEW
B	05/06/13	FOR CLIENT REVIEW
A	05/01/13	FOR INTERNAL REVIEW

MINNESOTA ORE OPERATIONS

DRAWN MSM DATE 03/14/14

CHECKED AT DATE 03/14/14

WESTERN TAILINGS BASIN SURFACE SEEPAGE COLLECTION STUDY

CATCHMENT 2

PLAN AND PROFILE (1 OF 2)

SCALE AS SHOWN

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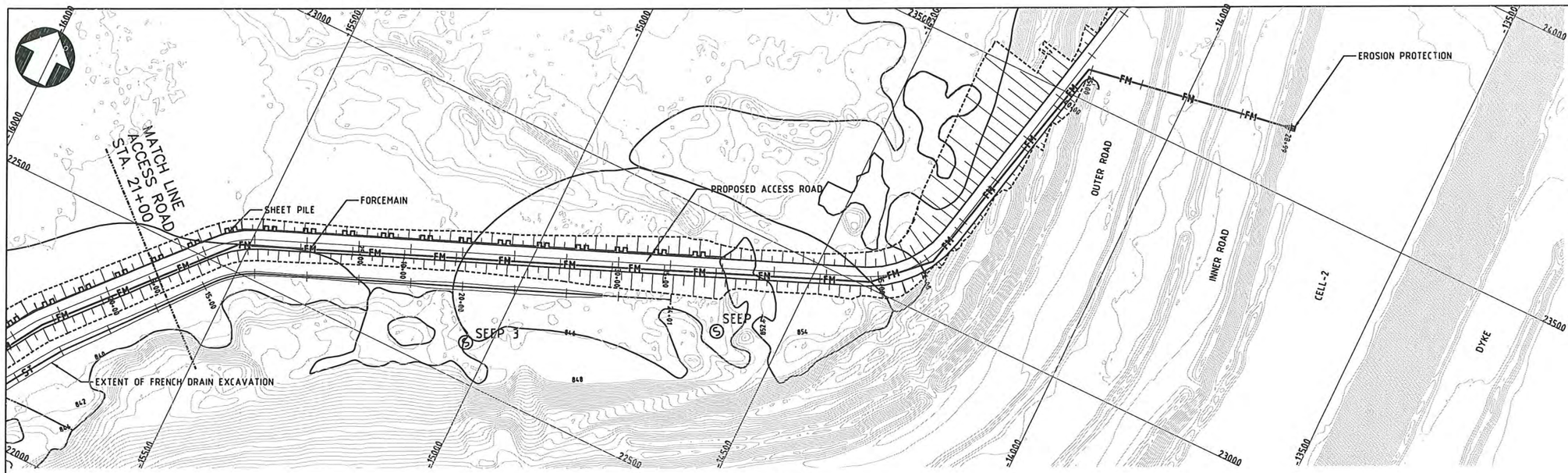

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NOTES:

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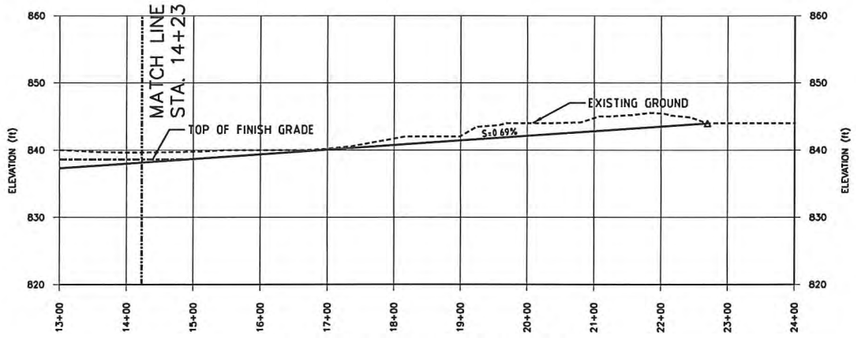

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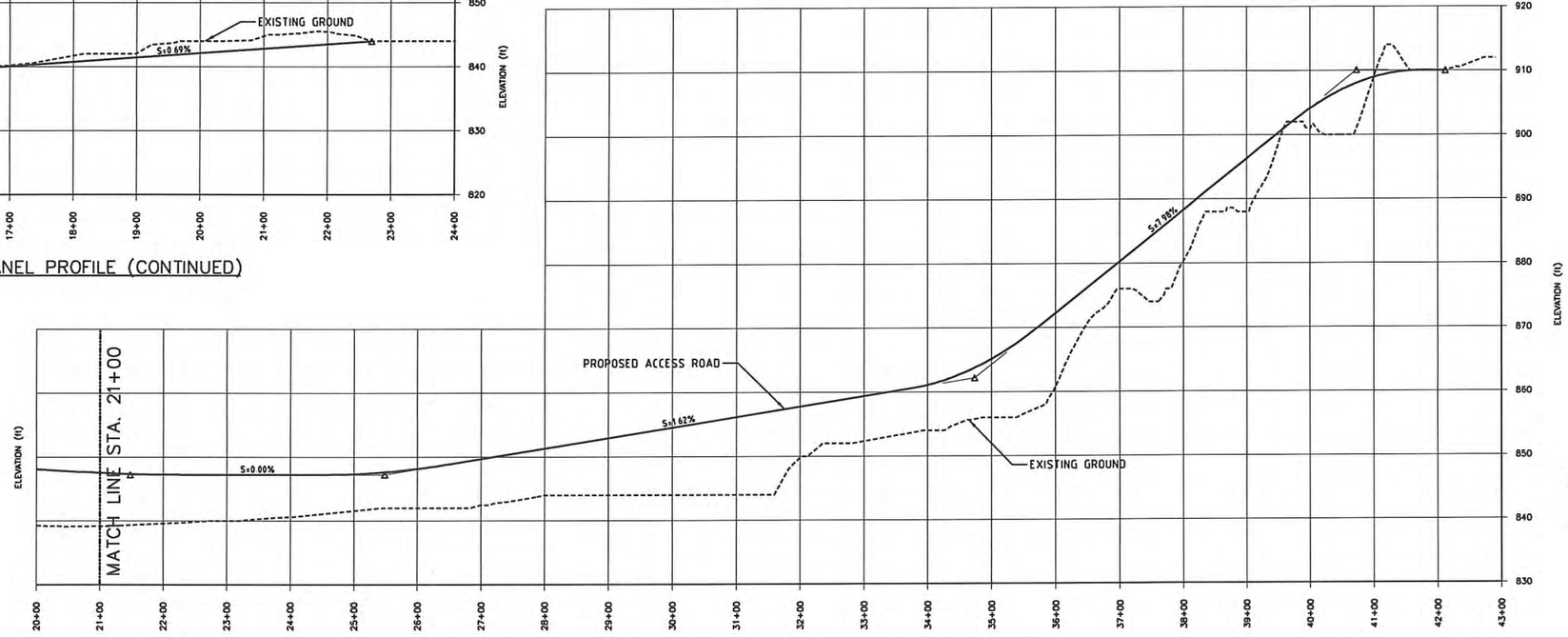

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APPROVED BY	DJ	03/14/14

PROJECT NO. 339306

MINNESOTA ORE OPERATIONS

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WESTERN TAILINGS BASIN SURFACE SEEPAGE COLLECTION STUDY

CATCHMENT 2

PLAN AND PROFILE (2 OF 2)

SCALE AS SHOWN

DISK NO.

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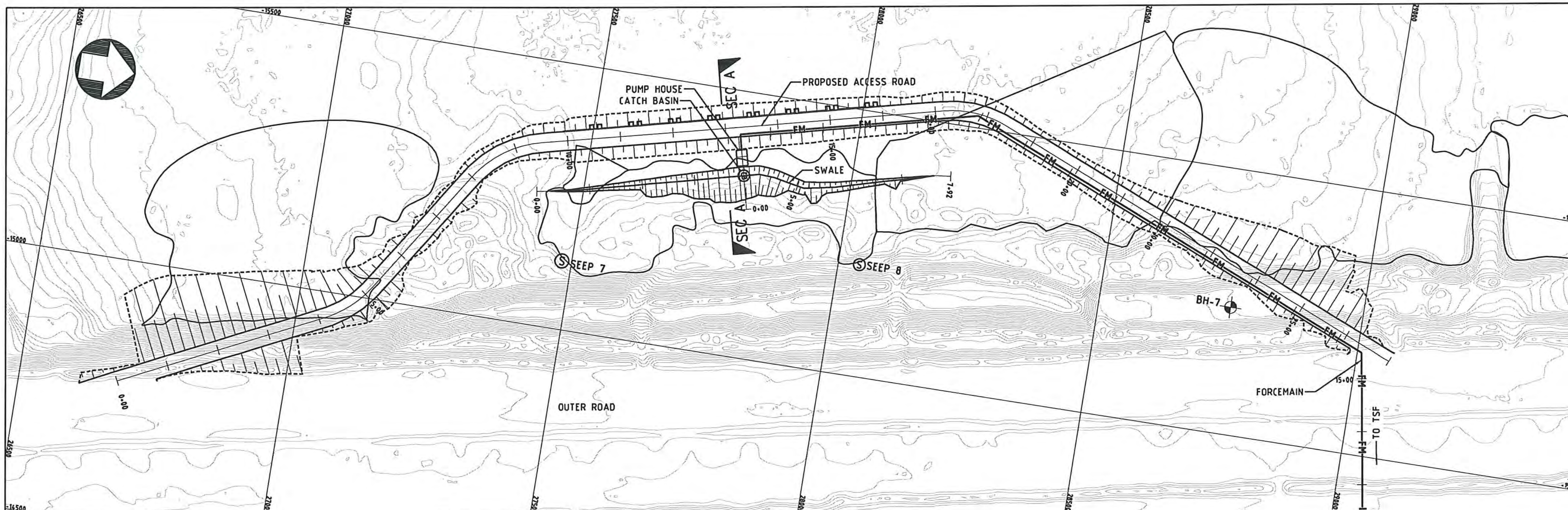

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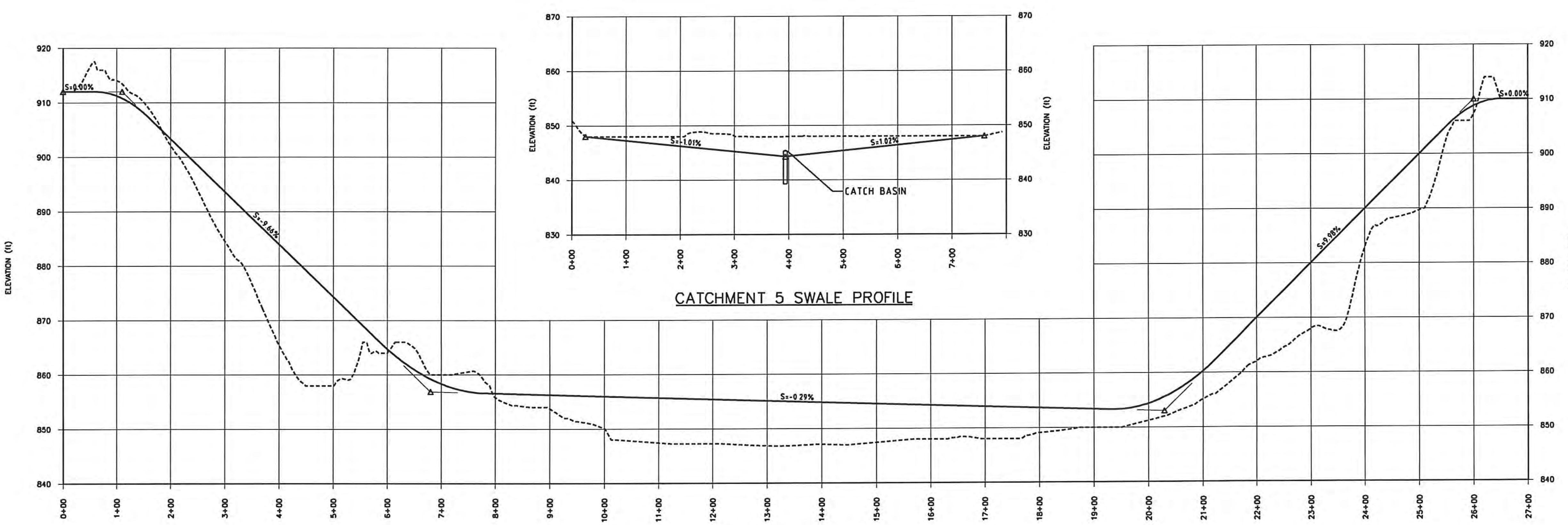

CATCHMENT 5 SWALE PROFILE

ACCESS ROAD PROFILE

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PROJECT 339306

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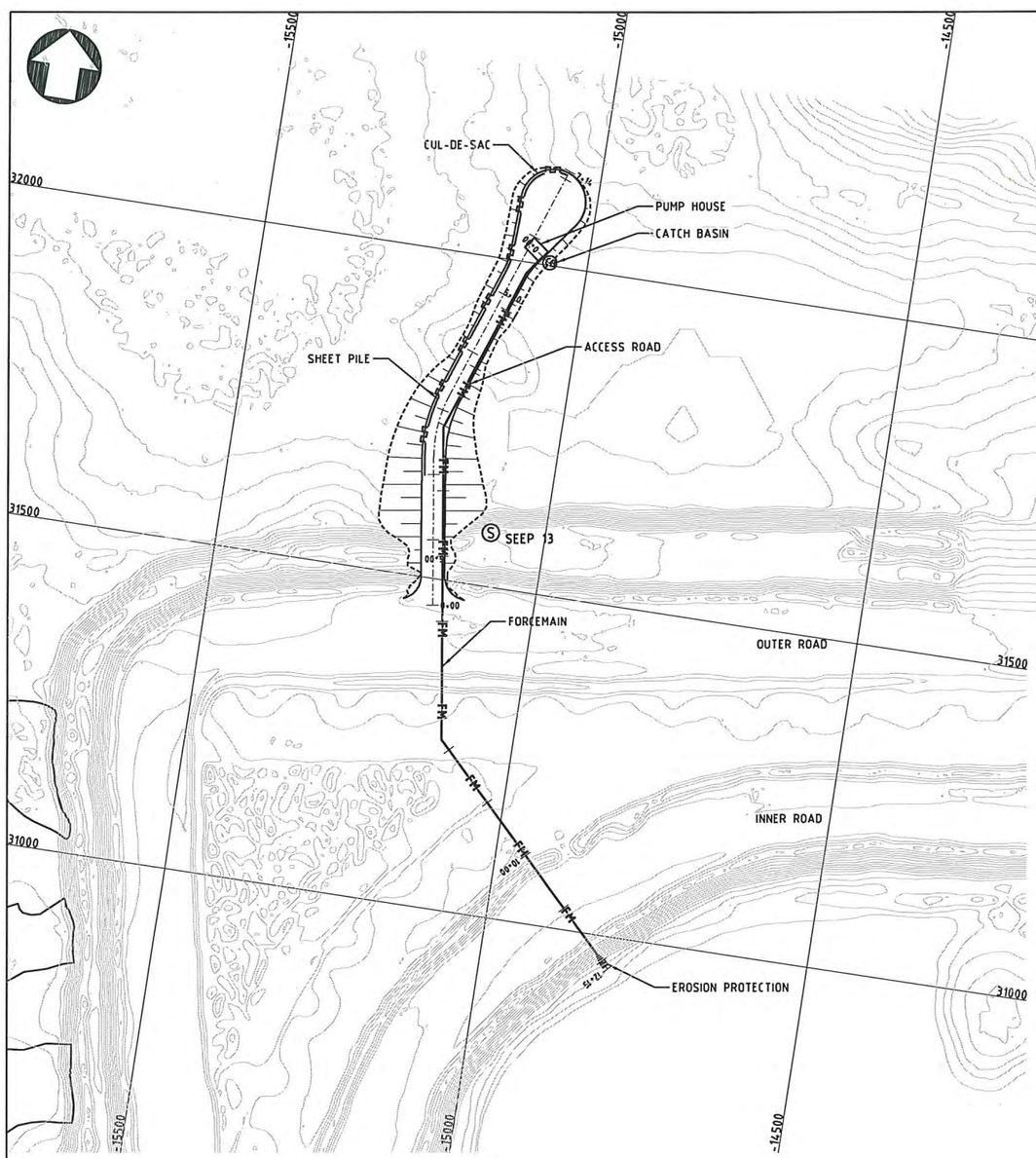
CHECKED	AT	03/14/14
APPROVED	DJ	03/14/14

USS MINNESOTA ORE OPERATIONS

DRAWN MSM DATE 03/14/14
CHECKED AT DATE 03/14/14

WESTERN TAILINGS BASIN SURFACE SEEPAGE COLLECTION STUDY
CATCHMENT 3
PLAN AND PROFILE

SCALE AS SHOWN
DISK NO.
DWG. NO. 339306-M-G-607



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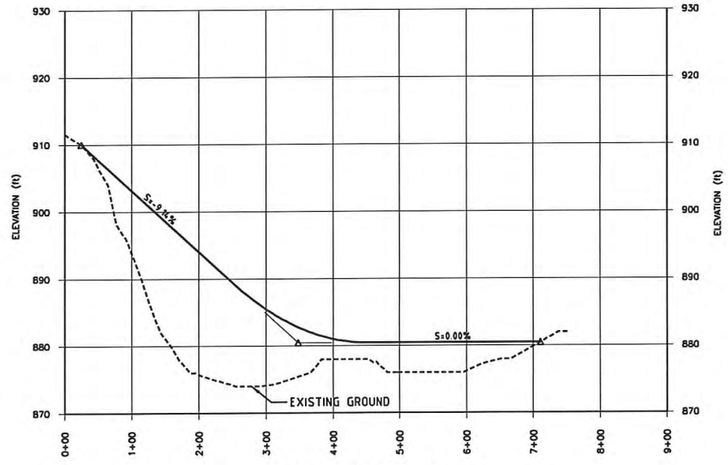

ACCESS ROAD PROFILE

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FOR CLIENT REVIEW

HOR 0 50 100 200 SCALE IN FEET

VER 0 5 10 20 SCALE IN FEET

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CHECKED	AT	03/14/14
APPROVED	DJ	03/14/14

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B	05/06/13	FOR CLIENT REVIEW
A	05/01/13	FOR INTERNAL REVIEW

MINNESOTA ORE OPERATIONS

DRAWN MSM DATE 03/14/14
CHECKED AT DATE 03/14/14

WESTERN TAILINGS BASIN SURFACE SEEPAGE COLLECTION STUDY
CATCHMENT 4
PLAN AND PROFILE
SCALE AS SHOWN
DISK NO.
DWG. NO. 339306-M-G-608

339306

PART I: BASIC APPLICATION
Additional Information
U.S. Steel Corporation – Minnesota Ore Operations
Minntac Western Seepage Collection Project

APPENDIX D

Wetland Delineation Report
Expanded Project Area for West Tailings Basin
Collection Return Project

WETLAND DELINEATION REPORT

West Tailings Basin
Expanded Project Area For
West Tailings Basin Collection Return Project

July 24, 2012
NTS Project #7892P

Prepared For:

USS Minntac
Mountain Iron, Minnesota

Prepared By:

NTS, Inc.
Virginia, Minnesota

Table of Contents

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Appendix B – Wetland Delineation Data Sheets

INTRODUCTION

This wetland delineation report is for the United States Steel Corporation (USS), Minnesota Ore Operations, Minntac Facility. The project area is located along the west and northwest boundaries of the Minntac Facility tailings basin. Minntac proposes to construct a seepage collection/return project within this area. Earlier stages of project design called for construction of seepage containment berms and lift stations within an area approximately 200 feet in width immediately adjacent to the existing outer tailings basin berm. The original project area boundary extended only along the west side of the tailings basin berm. The Final Wetland Delineation Report for the West Tailings Basin, released on November 16th, 2011, was prepared for the original project area and approved by the Wetland Technical Evaluation Panel.

Preliminary design of the seepage collection return system in 2012 has resulted in expansion of the project area beyond the boundaries used in the 2011 wetland delineation. This expanded area generally extends 350 feet west and north of the existing outer tailings basin berm and includes an additional segment that extends easterly from the NW corner of the tailings basin a distance of approximately 3000 feet. This wetland delineation report describes the expanded seepage collection area and documents the existence of wetlands and their respective boundaries within this area. The report describes methodology used to delineate wetlands and where necessary, to extend previously delineated boundaries out to the edge of the new project boundary. The results of this delineation report will be used to guide design and permitting for the west tailings basin seepage collection return project.

RELATIONSHIP OF THIS REPORT TO 2011 WETLAND DELINEATION REPORT

This report is intended as a companion to the 2011 Report. Along the west side of the tailings basin, 2011 wetland boundaries were extended out to the edge of the new project boundary. For this reason figures have been revised in this report to show wetland boundaries out to the edge of the new project boundary. The findings and conclusions and Table 1 Summary of Wetlands have been updated to reflect new wetland acreages for the previously delineated wetlands as well as summary information for seven new wetlands delineated along the north side of the tailings basin. Where appropriate, we have updated site descriptions and wetland characteristics. We have added a brief description in the methodology section that outlines procedures used to extend the 2011 wetland boundaries out to the new expanded project area boundary.

SITE DESCRIPTION AND LOCATION

The project location is shown in Figure 1. The project area is located along approximately five miles of the outer tailings basin berm and encompasses approximately 225 acres. The project area is bounded to the east and south by the outer tailings basin berm, which forms an abrupt boundary with adjacent wetlands. The south ½ of the project is bounded to the west by a road-power line corridor. The remaining west boundary extends a distance of approximately 350 feet west and north from the edge of the outer tailings basin berm. Land cover/land use within the project is a mixture of upland forest, wetland and scattered areas of mining cut and fill.

The Dark River forms an expansive flowage just west of the project area and is fed by several seeps that discharge along the west edge of the tailings basin. An additional larger seepage area is located east of the northwest corner of the tailings basin. An abandoned farmstead with fallow fields is located just north of these tributaries.

Topography
With the exception of localized areas where mining-related topographic alterations have occurred, topography within the project area is mostly level to gently rolling. Mining facility berms and dump areas adjacent to the project area are often very steep. Figure 2 shows the project area topography.

Vegetation
Vegetative cover within the project area is dominated by upland forest, forested wetland and shrub/wet meadow wetlands. At the south end of the project, shallow and deep marsh wetlands have formed within areas impounded by beaver dams and tailings basin berms. The old farmstead located at the north end of the project area is dominated by native and non-native upland grasses and forbs, which scattered pockets of shrub. This old field is gradually succeeding to forest. Where mining-related fill has been placed, early-successional forest and shrub communities have become established.

Soils
Dominant soils in the project area include Balkin, Nashwalk and Keewatin loam soil on upland areas. Within wetland areas, depressional Balkin, Cathro Muck, Rifle Muck and Bowstring Fluvaquent soils occur. The Cathro, Rifle Muck and Bowstring soils are generally associated with floodplain wetland areas along the Dark River flowage and tributaries. With the exception of the Nashwauk loam, soils within the project area are generally poorly to very poorly drained. A clay pan is often present at approximately 10-14 inches, which made excavation of soil pits difficult in many locations.

Near the edges of tailings basin berms and the road/power line corridor, mine-related fill material is commonly found in linear piles. The mine fill generally consists of a grey to brown crushed rock material mixed with fines. This mine fill material is generally very permeable and does not support wetland hydrology unless the water table relative to the fill material surface is high. Near the Dark River tributaries, peaty dredge spoil material is found at several locations.

Hydrology
Precipitation in the area at the time of the delineation was normal with no recent heavy rains, flooding, drought or other events that would otherwise impact evaluation of hydrology indicators. A shallow aquitard is present on much of the project area due to the presence of an impermeable clay pan. The mine dumps berms, and other related features have likely altered surface and groundwater hydrology though changes to wetland catchment area, flow path of runoff, dewatering channels and other changes to local topography. Placement of mine fill has likely created new wetlands or expanded existing wetlands in a number of locations. Where mine fill has been placed over the poorly drained soils such as the Balkan Loam, creating depressions or blocking drainage, wetlands have been formed. In other cases, it appears that new wetlands have been created by groundwater seeps discharging from the toe of tailings basin slopes. Within the southern-most portion of the project area, a combination of beaver dams, roads, and tailings basin berms, have significantly enlarged several wetlands and changed what was formerly wet meadow and shrub wetlands to deep marsh.

CONTACT INFORMATION

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METHODOLOGY

The methodology of the 1987 Army Corps of Engineer Wetland Delineation Manual and Interim Regional Supplement for the North Central and Northeast Region were used to delineate wetlands within the project area.

Prior to commencing field work, National Wetland Inventory and USGS topographic maps (Figure 2), the St. Louis County Soil Survey and aerial photography were reviewed for potential wetlands. These layers were reviewed in GIS to identify potential wetland areas. The entire project area was then systematically inspected for potential wetlands with sample points taken within all areas that were potentially wetland. Where wetlands were determined to exist, wetlands were assigned a unique number with "W" to denote wetland. If wetlands were not determined to exist at the sample point, the sample point was assigned the next number in the sequence following "NW" for non-wetland. Where wetlands were determined to exist, an upland sample point was established near the wetland-upland boundary. Wetland, upland and non-wetland sample point data sheets are in Appendix B.

All wetland sample points were located in the field with GPS. Wetland boundaries were then flagged with wetland delineation flagging and located with GPS. The final wetland boundaries were digitized from a combination of GPS points and aerial photo interpretation. Where two or more major wetland types occur within a delineated wetland, the delineated wetland polygon has been further subdivided by wetland type. ***Note that many of the wetland boundaries continue west out of the project area. Wetland boundaries were delineated to a distance of approximately 350 feet west and north of the tailings basin outer berm or to the road along the west boundary of the project area south of the Dark River.***

Extension of 2011 Wetland Boundaries to Expanded Project Area

The 2011 wetland boundaries were mapped with GPS and flagged. In most cases, these boundaries extended approximately 250-300 feet from the outer tailings basin. These boundaries were later clipped within the original project area. To extend the 2011 wetland boundaries out to the expanded 2012 project boundary, wetland boundary points and flagging was relocated in the field. Boundaries were then flagged and mapped with GPS out to the new boundary.

Observation Point Data Collection

The methodology described in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) were used to evaluate hydrology, vegetation and soils at each wetland. Observation points located within the wetland and at an upland location adjacent to the wetland.

Soils were evaluated by excavating a pit to a depth of approximately 16 inches or deeper unless a restrictive layer was encountered. Soils were evaluated for primary and secondary indicators using the NC-NE Regional Supplement. Where appropriate, soils were checked at other locations along the wetland-upland boundary to verify presence of hydric soils.

Vegetation was sampled with fixed radius nested plots of 5, 15 and 30 foot radius for the herbaceous, shrub and tree/vine stratums, respectively. Delineations performed in 2012 utilized the revised List of Plants that Occur in Wetlands.

The presence of wetland hydrology was based on depth to saturated soil or water table as well as other primary and secondary indicators.

WETLAND CHARACTERISTICS

Type 2, 3, 4, 5, 6 and 7 wetlands were identified within the project area. The following describes characteristics of these wetlands within the project area.

Type 2 (Wet Meadow)

Type 2 wetlands generally occur along the fringes of other wetland types in the project area.

Vegetation: *Carex lacustris, Pharlaris arundinacea Carex spp., Eupatorium perfoliatum, Scirpus cyperinus, Circum muticum.*

Hydrology: Saturated soil and high water table indicated hydrology in these wetlands.

Soils: Sapric peat/muck or depressional Balkin soils characterize these wetlands.

Wetland Boundary: Mine fill, often rock material with native/introduced mix of grass/forbs.

Type 3 (Shallow Marsh)

Vegetation: *Calamogrostis canadensis, Typhia latifolia, Carex lacustris, Eupatorium maculatus with occasional, shrubs and forbs*

Hydrology: Surface water to depths of 1 foot, stumted/flooded vegetation

Soils: 2 cm of muck, depleted loam soils

Wetland Boundary: Mine fill or upland forest dominated by *Populus tremuloides, Betula papyriferia, Acer rubrum and Abies balsamea.* Shrubs include *Corylus cornuta, Viburnum dentatum* Loniceria canadensis. Groundcover species include *Aster macropyhyllum, Aralia nudcaulis and Pteridimm aquilinum*

Type 4 (Deep Marsh)

Vegetation: *Typhia latifolia, Carex lacustris,* floating-leaf and submergent macrophytes.

Hydrology: Inundated with one foot or more of water

Soils: Muck

Wetland Boundary: Type 3, 6 and 7 wetland. Edge of tailings basin fill slope often extends to edge of these wetlands.

Type 5 (Shallow Open Water)

Vegetation: Floating-leaf and submergent macrophytes.

Hydrology: Inundated to depth of several feet or more

Soils: Lacustrine sediments

Wetland Boundary: Type 3 wetland. Edge of tailings basin fill slope often extends to edge of these wetlands.

Type 6 (Shrub Swamp)

Vegetation: *Populus tremuloides, Alnus rugosa, Cornus stoloniferia, Viburnum dentatum, Ribies americanum Rubus strigosus, Pharlarus arundinacea, Calamogrostis canadensis Carex spp.*

Hydrology: Depressional or drainageway geomorphic position; Fac-Neutral test, saturation or high water table.

Soils: Depleted matrix, mucky mineral soils.

Wetland Boundary: Mine fill or upland forest dominated by *Populus tremuloides, Betula papyriferia, Acer rubrum and Abies balsamea.* Shrubs include *Corylus cornuta, Viburnum dentatum* Loniceria canadensis. Groundcover species include *Aster macropyhyllum, Aralia nudcaulis and Pteridimm aquilinum*

Type 7 (Wooded Swamp)

Vegetation: *Populus tremuloides, Fraxinus nigra, Abies balsamea, Acer rubrum, Larix laracina, Cornus stoloniferia, Rubus strigosus, Calamogrostis canadensis, Equisitum sylvaticum, Rubus pubscens.*

Hydrology: Saturation and water table within 12 inches – drainage patterns with water stained vegetation.

Soils: Depleted matrix, loamy mucky mineral.

Wetland Boundary: Mine fill or upland forest dominated by *Populus tremuloides, Betula papyriferia, Acer rubrum and Abies balsamea.* Shrubs include *Corylus cornuta, Viburnum dentatum* Loniceria canadensis. Groundcover species include *Aster macropyhyllum, Aralia nudcaulis and Pteridimm aquilinum*

FINDINGS AND CONCLUSIONS

97.8 acres of Type 2, 3, 4, 5, 6 and 7 wetlands were identified within 32 wetland areas. The location of these wetlands and a breakdown of acres by wetland type are shown in Table 1. Wetland boundaries and sample point locations are shown in Appendix A, Figures 4A-4F Data sheets for the 2011 wetlands (W1-W26) are shown in Appendix B of the 2011 Delineation Report. Data sheets for the wetlands delineated within the expanded project area (W27-W33) are shown in Appendix B of this report.

TABLE 1 – WETLAND SUMMARY

WETLAND ID	SHEET	ACRES BY WETLAND TYPE						TOTAL ACRES
		2	3	4	5	6	7	
1	4A			1.37				1.37
2	4A					1.88		1.88
3	4A					2.66		2.66
4	4A						1.02	1.02
5	4A/4B					4.02		4.02
6	4B						3.89	3.89
7	4B					1.80	2.04	3.84
8	4B						4.41	4.41
10	4C						9.18	9.18
11	4C		0.32	0.53			7.64	8.49
12	4C						2.98	2.98
13	4C/4D			1.93	3.04		1.36	6.33
14	4D					0.11		0.11
15	4D					0.55		0.55
16	4D						0.20	0.20
17	4D	0.07						0.07
18	4D		0.73					0.73
19	4D						0.33	0.33
20	4D		0.36				0.79	1.15
21	4D				0.49		1.35	1.84
22	4E						0.21	0.21
23	4E			2.70		2.24		4.94
24	4E						0.46	0.46
25	4E					0.04		0.04
26	4F			9.36	14.80			24.16
27*	4A						0.66	0.66
28*	4A					0.12		0.12
29*	4A		1.17					1.17
30*	4A		0.12					0.12
31*	4A						1.05	1.05
32*	4A				3.70	1.34		5.04
33*	4A					1.93	2.86	4.79
TOTAL ACRES		0.07	2.70	15.89	22.03	16.69	40.43	97.81

Wetlands Delineated in 2012

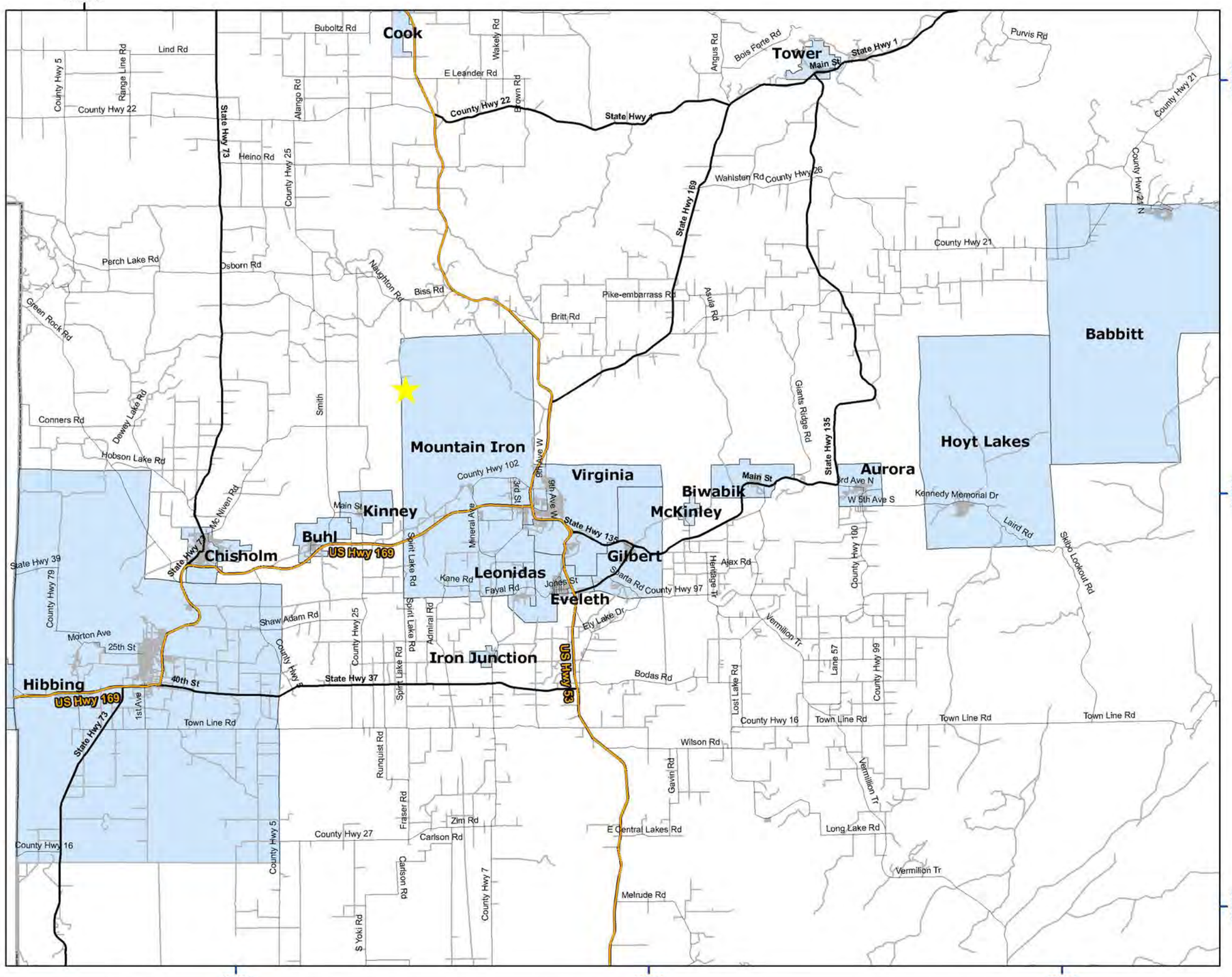
APPENDIX A

WEST TAILINGS BASIN

WETLAND DELINEATION REPORT

FIGURES

REVISED JULY 24, 2012



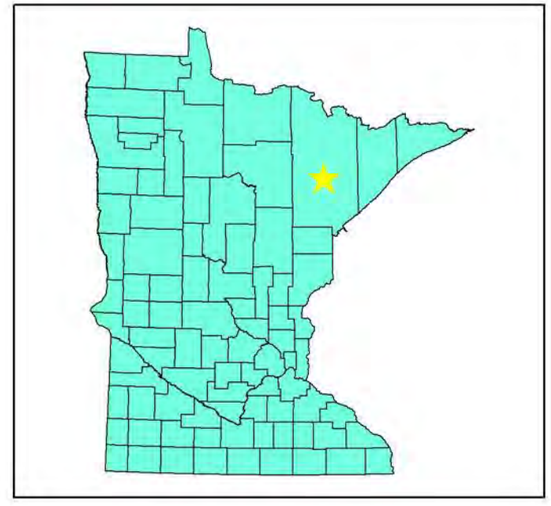
Scale in Miles

0 2.5 5 10

1 inch = 25,000 feet

Legend

Project Location



Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us

526 Chestnut Street
Virginia, MN 55792-1142
218.741.4290

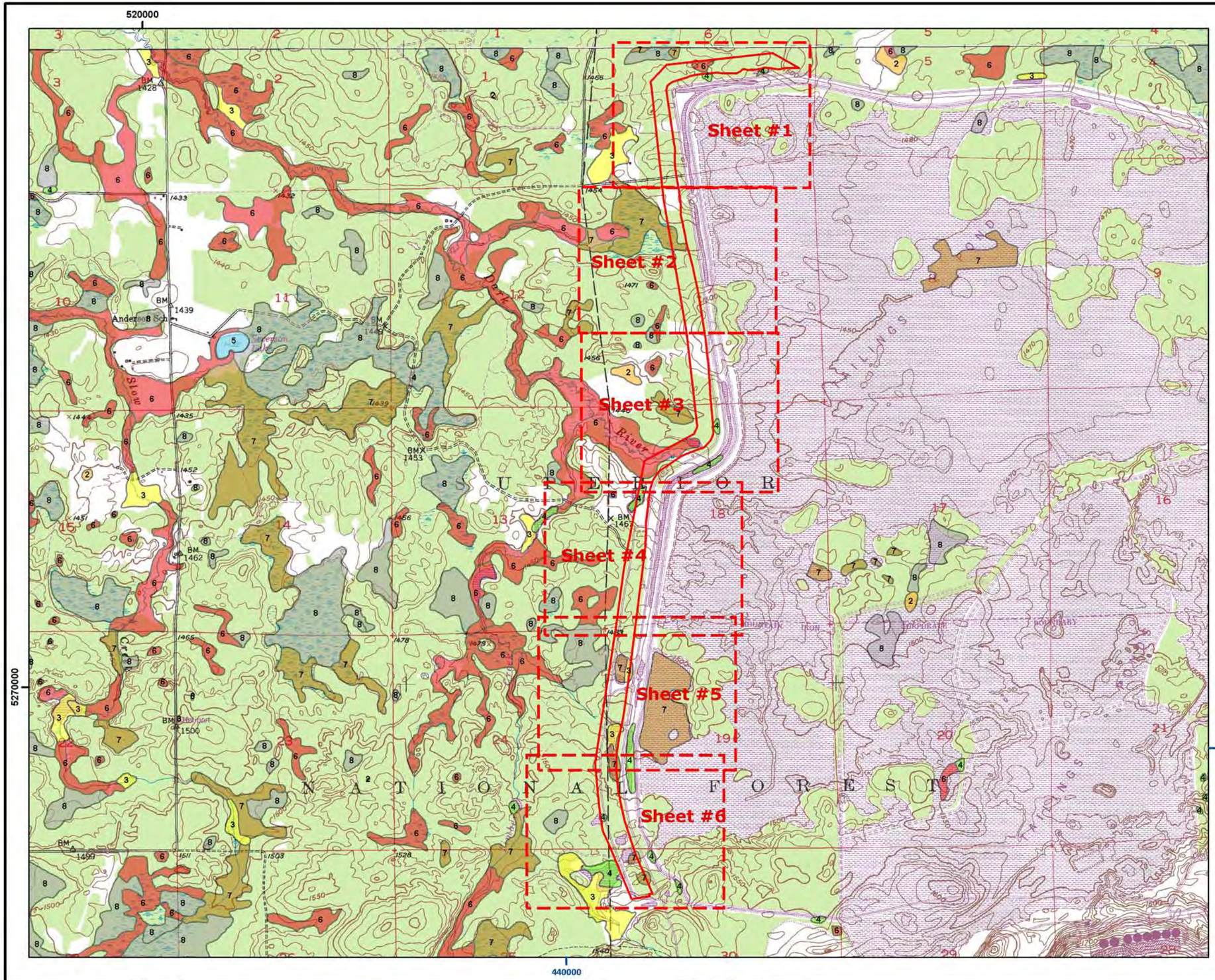
Version	Description	Drawn	Date	Checked	Date
1		KLA	8/8/2011	DAF	8/8/2011

Minntac Tailings Basin West Side
Wetland Delineation Report
Mountain Iron, Minnesota

Figure 1
Project Location Map

NTS Project #: 7892G

Date: 8 Aug 2011



Scale in Feet

0 2,400 4,800

1 inch = 2,400 feet

Legend

- Project Boundary

National Wetland Inventory

Circular 39 Wetland Type

- Type 1 - Seasonally Flooded Basin or Flat
- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp
- Type 8 - Bogs

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us (2009 FSA)
Base map layers downloaded from: datagateway.nrcs.usda.gov

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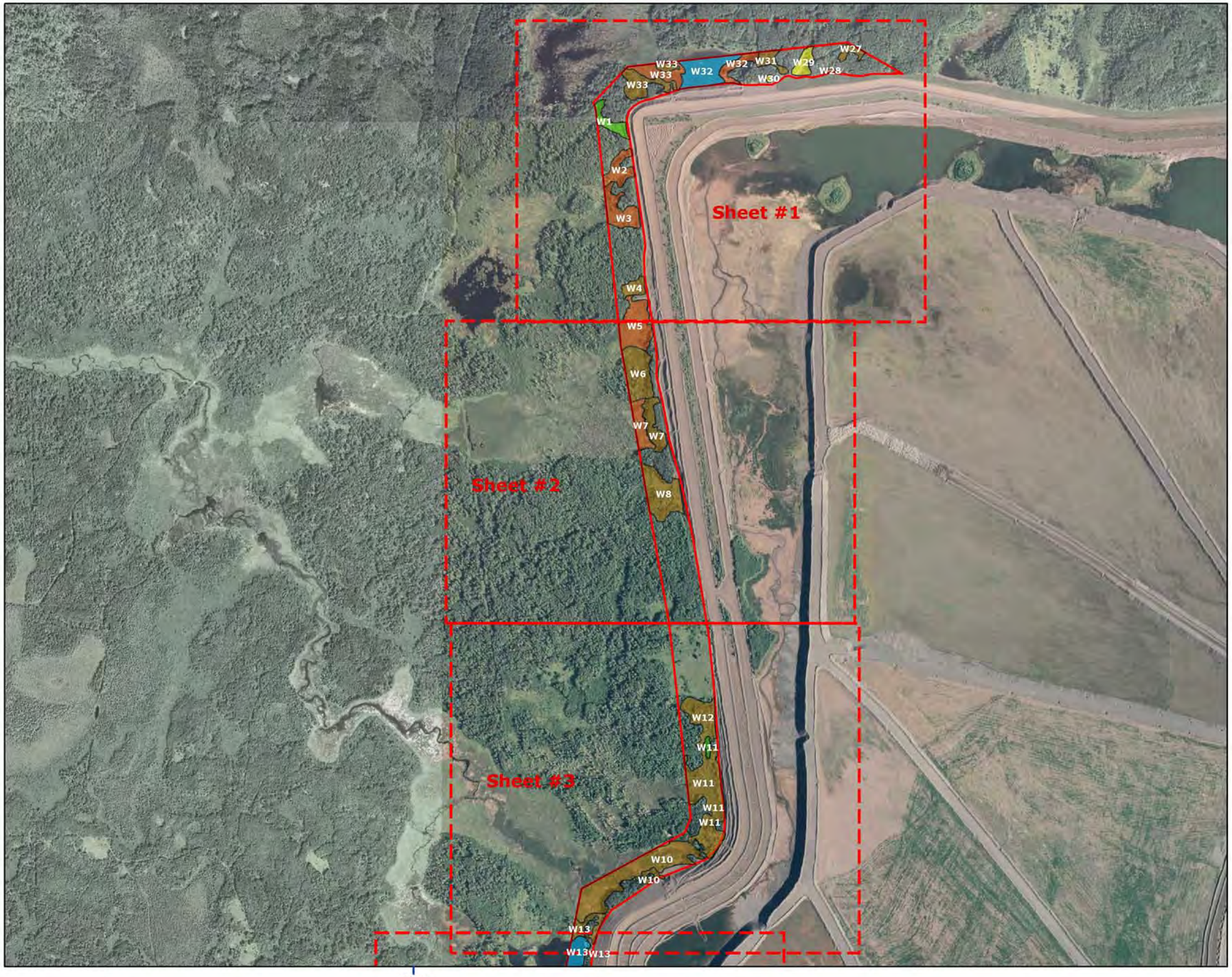
1		KLA	7/20/2012	ARD	7/20/2012

Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 2
Project Area With
USGS Topographic Map

NTS Project #: 7892P
Date: 20 July 2012

1/2



Scale in Feet

0 1,200 2,400

1 inch = 1,200 feet

Legend

- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us (2009 FSA)
Base map layers downloaded from: datagateway.nrcs.usda.gov

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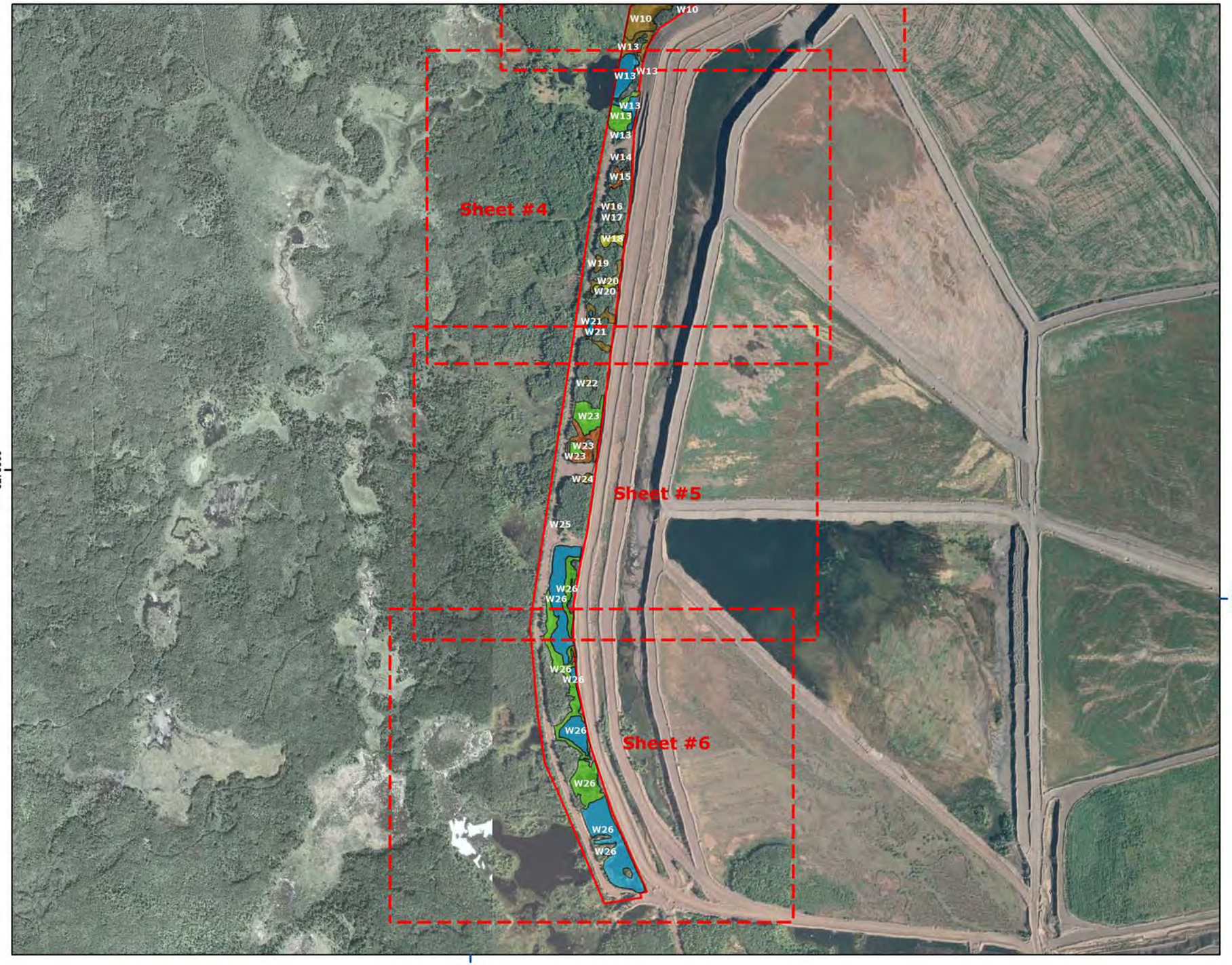
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 3A
Project Area With
Aerial Photography

NTS Project #: 7892P
Date: 20 July 2012



Scale in Feet

0 1,200 2,400

1 inch = 1,200 feet

Legend

- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us (2009 FSA)
Base map layers downloaded from: datagateway.nrcs.usda.gov

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Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 3B
Project Area With
Aerial Photography

NTS Project #: 7892P
Date: 20 July 2012

2
3

Scale in Feet

0 400 800

1 inch = 400 feet

Legend

NTS Wetland Observation Points

- Wetland Boundary Point
- Upland Point
- Wetland Point
- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us (2009 FSA)
Base map layers downloaded from: datagateway.nrcs.usda.gov

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Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 4A
Wetland Boundary Map
Sheet# 1

NTS Project #: 7892P
Date: 20 July 2012

Scale in Feet

0 400 800

1 inch = 400 feet

Legend

NTS Wetland Observation Points

- Wetland Boundary Point
- Upland Point
- Wetland Point
- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us (2009 FSA)
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Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 4B
Wetland Boundary Map
Sheet# 2

NTS Project #: 7892P
Date: 20 July 2012

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Legend

NTS Wetland Observation Points

- Wetland Boundary Point
- Upland Point
- Wetland Point
- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us (2009 FSA)
Base map layers downloaded from: datagateway.nrcs.usda.gov

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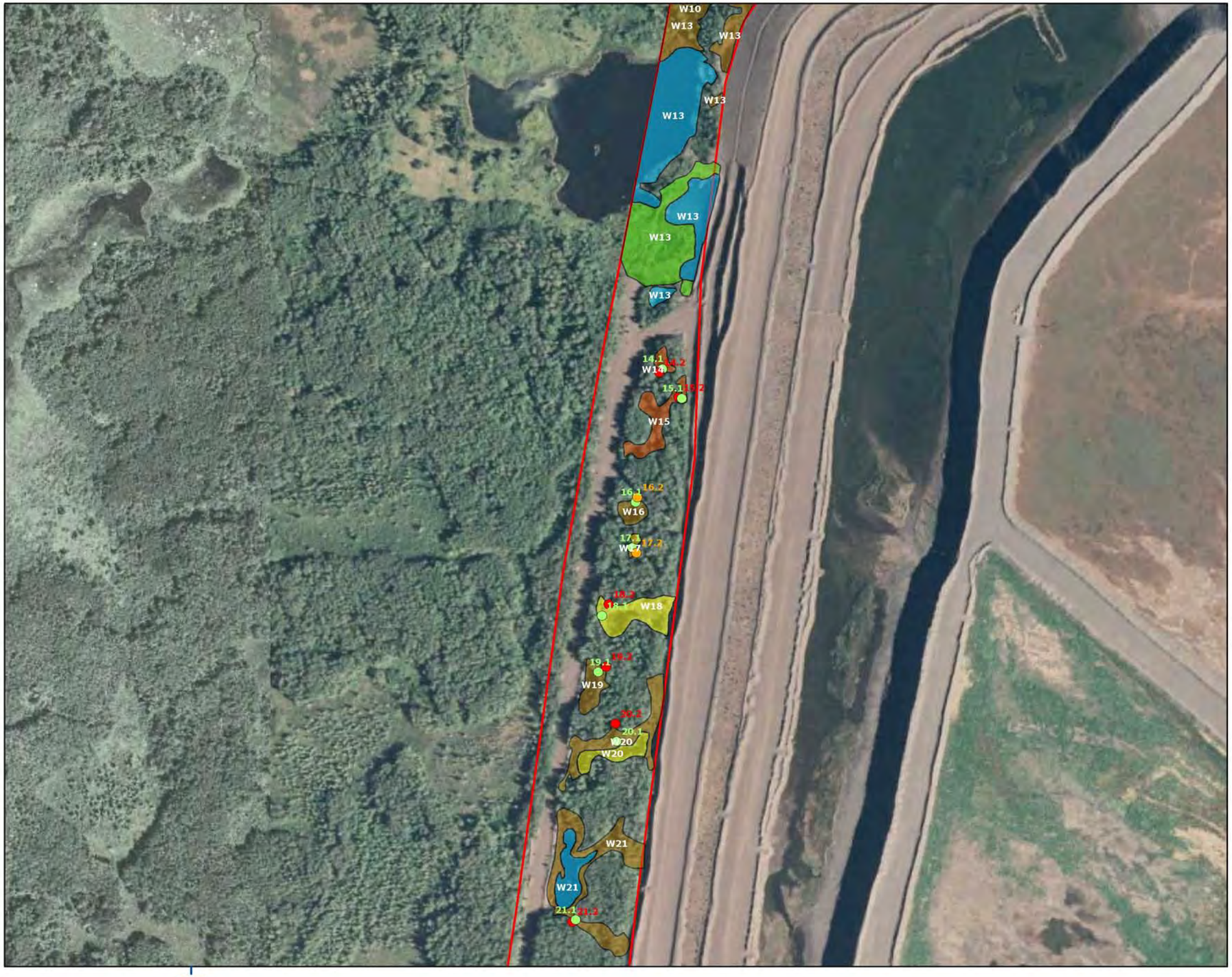
Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 4C
Wetland Boundary Map
Sheet# 3

NTS Project #: 7892P
Date: 20 July 2012

3
4



Scale in Feet

0 400 800

1 inch = 400 feet

Legend

NTS Wetland Observation Points

- Wetland Boundary Point
- Upland Point
- Wetland Point
- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
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Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 4D
Wetland Boundary Map
Sheet# 4

NTS Project #: 7892P
Date: 20 July 2012

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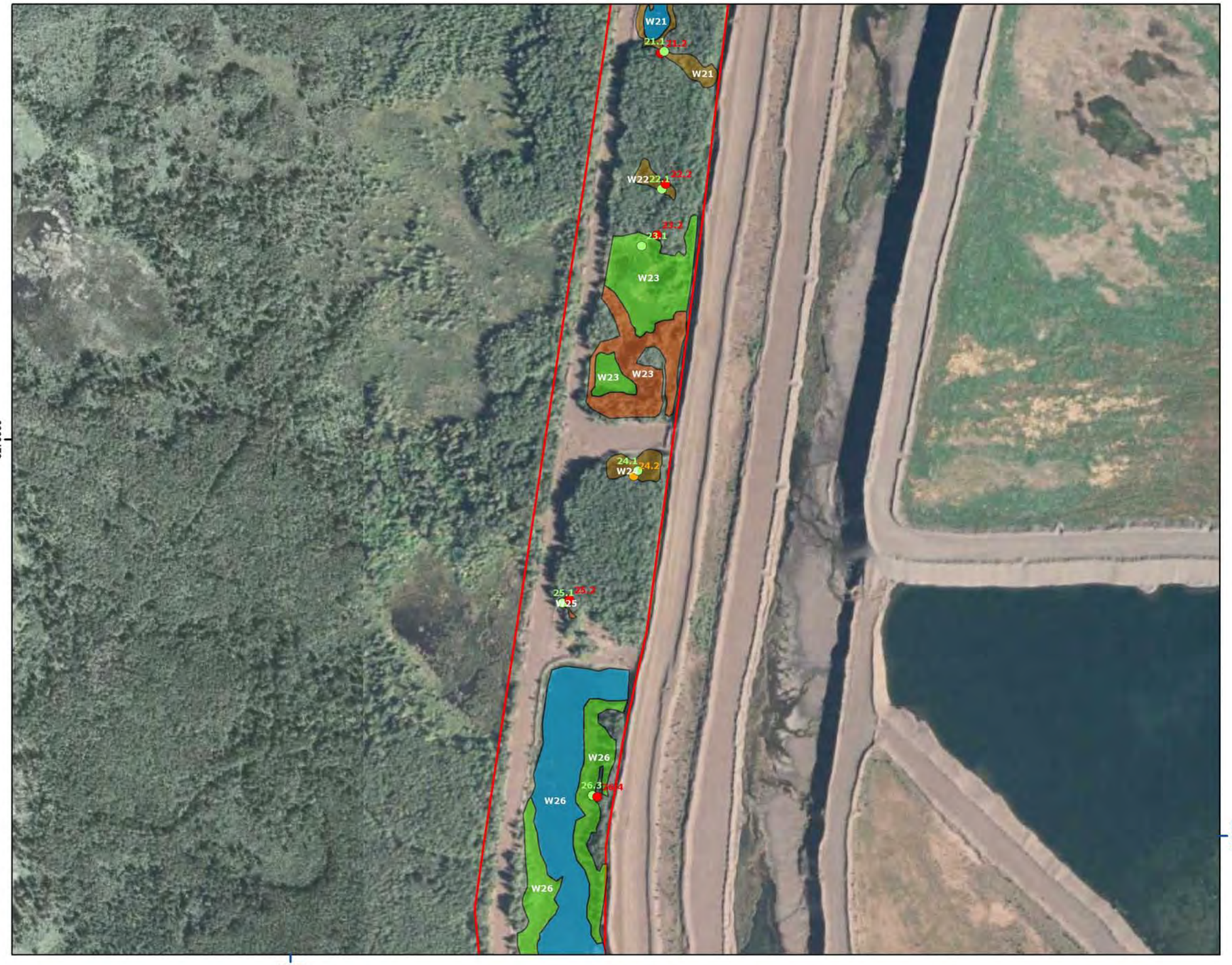

Scale in Feet

0 400 800

1 inch = 400 feet

Legend

NTS Wetland Observation Points

- Wetland Boundary Point
- Upland Point
- Wetland Point
- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
Base map layers downloaded from: lmic.state.mn.us (2009 FSA)
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Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 4E
Wetland Boundary Map
Sheet# 5

NTS Project #: 7892P
Date: 20 July 2012

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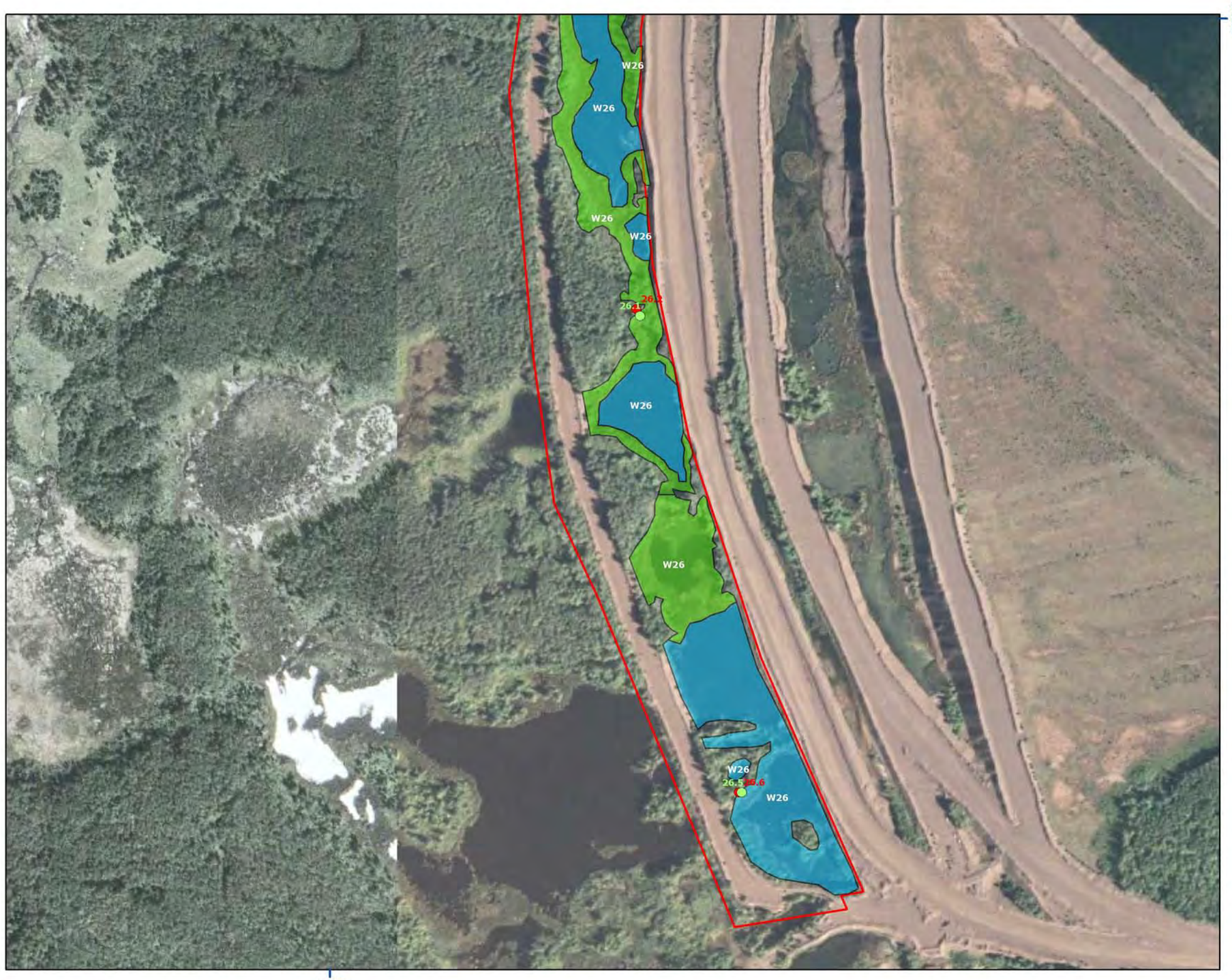

Scale in Feet

0 400 800

1 inch = 400 feet

Legend

NTS Wetland Observation Points

- Wetland Boundary Point
- Upland Point
- Wetland Point
- Project Boundary

NTS Wetland Delineation

Circular 39 Wetland Type

- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Marsh
- Type 6 - Shrub Swamp
- Type 7 - Wooded Swamp

Black Grid = UTM, Zone 15N, NAD83, meters
Blue Grid = St. Louis County (Central), NAD83, feet
Public data downloaded from: deli.dnr.state.mn.us
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Minntac Tailings Basin West Side
Wetland Delineation Report 2012
Mountain Iron, Minnesota

Figure 4F
Wetland Boundary Map
Sheet# 6

NTS Project #: 7892P
Date: 20 July 2012

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APPENDIX B

WEST TAILINGS BASIN

WETLAND DELINEATION REPORT

DATA SHEETS

FOR WETLANDS #27-33 DELINEATED 7-24-12

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892N City/County: St. Louis Sampling Date: 061212
Applicant/Owner: USS-Minntac State: MN Sampling Point OP-01
Investigator(s): DeMars/Kleist Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
Slope (%): 5 Lat.: 1721086 Long.: 17305108 Datum: UTM, Zone 15
Soil Map Unit Name: Keewatin-Nashwauk complex, 0-8% slopes, stony NWI Classification: PFO
Are climatic/hydrologic conditions of the site typical for this time of the year? ____ (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W27

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	X	No	____	Depth (inches): 7.5
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-01

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	25	Y	FAC
2	*Acer rubrum*	20	Y	FAC
3	*Betula papyrifera*	5	N	FACU
4				
5				
6				
7				
8				
9				
10				
		50	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	30	Y	FACU
2	*Rubus idaeus*	20	Y	FAC
3	*Acer rubrum*	10	N	FAC
4				
5				
6				
7				
8				
9				
10				
		60	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Athyrium filix-femina*	30	Y	FAC
2	*Rubus pubescens*	20	Y	FACW
3	*Thelypteris palustris*	10	N	FACW
4	*Asarum canadense*	8	N	UPL
5	*Solidago gigantea*	7	N	FACW
6	*Onoclea sensibilis*	5	N	FACW
7				
8				
9				
10				
11				
12				
13				
14				
15				
		80	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	10	25
Sapling/Shrub Stratum	12	30
Herb Stratum	16	40
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 83.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	42	x 2 =	84
FAC species	105	x 3 =	315
FACU species	35	x 4 =	140
UPL species	8	x 5 =	40
Column totals	190 (A)		579 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

X Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR2/1	100					Silty Loam	W/High Organic
3-7	10YR 2/1	70	10YR 5/2	30	D	M	Silty Loam	
7-11	10YR 6/2	70	N 6/0	30	D	M	Silty Clay Loam	
11-13	10YR 6/2	70	10YR 6/6	30	C	M	Clay Loam	
13-18	10YR 6/2	100					Clay Loam	Bottom of Pit at 18"

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project - 7992P City/County: St. Louis Sampling Date: 061212
Applicant/Owner: USS State: MN Sampling Point OP-02
Investigator(s): DeMars/Kleist Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex
Slope (%): 5 Lat.: 1721131 Long.: 17304991 Datum: UTM, Zone 15
Soil Map Unit Name: Keewatin Nashwauk complex, 0-8% slopes, stony NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? ____ (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches):	
Water table present?	Yes ____	No X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-02

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	35	Y	FAC
2	*Acer rubrum*	25	Y	FAC
3	*Betula papyrifera*	10	N	FACU
4				
5				
6				
7				
8				
9				
10				
		70	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	20	Y	FACU
2	*Acer rubrum*	10	Y	FAC
3	*Rubus idaeus*	6	N	FAC
4	*Ribes americanum*	4	N	FACW
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Athyrium filix-femina*	20	Y	FAC
2	*Rubus pubescens*	15	Y	FACW
3	*Eurybia macrophylla*	10	N	UPL
4	*Aralia nudicaulis*	8	N	FACU
5	*Pteridium aquilinum*	7	N	FACU
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		60	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	14	35
Sapling/Shrub Stratum	8	20
Herb Stratum	12	30
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 83.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	19	x 2 =	38
FAC species	96	x 3 =	288
FACU species	45	x 4 =	180
UPL species	10	x 5 =	50
Column totals	170 (A)		556 (B)

Prevalence Index = B/A = 3.27

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR2/1	100					Loam	
2-7	10YR 5/3	95	7.5YR 4/6	5	C	M	Silty Clay Loam	
7-16	10YR 6/4	90	10YR 6/6	10	C	M	Silty Clay Loam	Bottom Pit at 16"

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061412
Applicant/Owner: USS-Minntac State: MN Sampling Point OP-03
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
Slope (%): 0% Lat.: 1720946 Long.: 17304830 Datum: UTM, Zone 15
Soil Map Unit Name: Keewatin Nashwauk cinokexm 0-8% slopes, stony NWI Classification: PEM/PSS
Are climatic/hydrologic conditions of the site typical for this time of the year? ____ (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W28

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	X	No	____	Depth (inches): 2
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-03

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Salix interior*	25	Y	FACW
2	*Salix discolor*	10	Y	FACW
3	*Populus tremuloides*	5	N	FAC
4				
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Calamagrostis canadensis*	30	Y	OBL
2	*Typha angustifolia*	20	Y	OBL
3	*Phalaris arundinacea*	10	N	FACW
4	*Glyceria striata*	8	N	OBL
5	*Epilobium coloratum*	7	N	OBL
6	*Carex vulpinoidea*	5	N	OBL
7				
8				
9				
10				
11				
12				
13				
14				
15				
		80	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	8	20
Herb Stratum	16	40
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	70	x 1 =	70
FACW species	45	x 2 =	90
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	120 (A)		175 (B)

Prevalence Index = B/A = 1.46

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 2/1	100					Loam	Hemic Peat
4-8	10YR 5/1	100					Silty Clay Loam	
8+								Bedrock/Boulders

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- X 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Rock
Depth (inches): 8

Hydric soil present? Y

Remarks:
Upper 2" of depleted layer meets F3. Shallow bedrock creates unique conditions and would also warrant use

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061412
Applicant/Owner: USS-Minntac State: MN Sampling Point OP-4
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex
Slope (%): 3% Lat.: 1720995 Long.: 17304861 Datum: UTM, Zone 15
Soil Map Unit Name: Keewatin Nashwauk complex, 0-8% slopes, stony NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? ____ (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No ____	Depth (inches): ____
Water table present?	Yes ____	No ____	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-4

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	60	Y	FAC
2	*Acer rubrum*	15	N	FAC
3	*Betula papyrifera*	5	N	FACU
4				
5				
6				
7				
8				
9				
10				
		80	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	30	Y	FACU
2	*Acer rubrum*	10	Y	FAC
3	*Lonicera canadensis*	5	N	FACU
4				
5				
6				
7				
8				
9				
10				
		45	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Eurybia macrophylla*	15	Y	UPL
2	*Aralia nudicaulis*	10	Y	FACU
3	*Pteridium aquilinum*	8	N	FACU
4	*Rubus pubescens*	7	N	FACW
5	*Maianthemum racemosum*	6	N	FACU
6	*Cornus canadensis*	4	N	FAC
7				
8				
9				
10				
11				
12				
13				
14				
15				
		50	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	16	40
Sapling/Shrub Stratum	9	23
Herb Stratum	10	25
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 5 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 40.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	7	x 2 =	14
FAC species	89	x 3 =	267
FACU species	64	x 4 =	256
UPL species	15	x 5 =	75
Column totals	175 (A)		612 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 2/1	100					Loam	
3-7	10YR 4/2	100					Silt Loam	
7-14	10YR 6/3	100					Silt Loam	30% rock
14								Bottom of Pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project City/County: St. Louis Sampling Date: 061412
Applicant/Owner: USS-Minntac State: MN Sampling Point OP-5
Investigator(s): DeMars/Essig Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression/Drainageway Local relief (concave, convex, none): Concave
Slope (%): 3% Lat.: 1720651 Long.: 17304849 Datum: UTM, Zone 15
Soil Map Unit Name: Balkin, depressional, Balkin complex, 0-2% slopes, stony NWI Classification: PEM/PSS
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W29

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	X	No	____	Depth (inches): 6
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-5

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	10	Y	FAC
2				
3				
4				
5				
6				
7				
8				
9				
10				
		10	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Calamagrostis canadensis*	40	Y	OBL
2	*Glyceria striata*	20	Y	OBL
3	*Scirpus cyperinus*	15	N	OBL
4	*Carex lacustris*	10	N	OBL
5	*Phalaris arundinacea*	3	N	FACW
6	*Solidago gigantea*	2	N	FACW
7				
8				
9				
10				
11				
12				
13				
14				
15				
		90	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	2	5
Herb Stratum	18	45
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	85	x 1 =	85
FACW species	5	x 2 =	10
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		125 (B)

Prevalence Index = B/A = 1.25

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 2/1	100						Hemic Peat
3-12	10YR 7/1	95	10YR 5/6	5	C	M	Silt Loam	
12+								Rock - Bottom of Pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Bedrock
Depth (inches): 12

Hydric soil present? Y

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061412
Applicant/Owner: USS State: MN Sampling Point OP-06
Investigator(s): DeMars/Essig Section, Township, Range:
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None
Slope (%): 5% Lat.: 1720689 Long.: 17304842 Datum: UTM, Zone 15
Soil Map Unit Name: Keewatin Nashwauk complex, 0-8% slopes, stony NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No	X	Depth (inches):	____
Water table present?	Yes ____	No	X	Depth (inches):	____
Saturation present? (includes capillary fringe)	Yes ____	No	X	Depth (inches):	____

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-06

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	50	Y	FAC
2	*Acer rubrum*	20	Y	FAC
3	*Abies balsamea*	10	N	FAC
4				
5				
6				
7				
8				
9				
10				
		80	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	40	Y	FACU
2	*Acer rubrum*	15	Y	FAC
3	*Lonicera canadensis*	5	N	FACU
4				
5				
6				
7				
8				
9				
10				
		60	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Eurybia macrophylla*	15	Y	UPL
2	*Aralia racemosa*	10	Y	FACU
3	*Maianthemum racemosum*	8	Y	FACU
4	*Pteridium aquilinum*	7	N	FACU
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		40	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	16	40
Sapling/Shrub Stratum	12	30
Herb Stratum	8	20
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 7 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 42.86% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	95	x 3 =	285
FACU species	70	x 4 =	280
UPL species	15	x 5 =	75
Column totals	180 (A)		640 (B)

Prevalence Index = B/A = 3.56

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-06

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 2/1	100					Silt Loam	
3-5	10YR 4/1	100					Loam	
5-14	10YR 6/2	100					Loam	
14								Clay Pan - bottom of pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Clay Plan
Depth (inches): 14

Hydric soil present? Y

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061412
Applicant/Owner: USS State: MN Sampling Point OP-7
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Drainageway Local relief (concave, convex, none): Concave
Slope (%): 2% Lat.: 1720260 Long.: 17304948 Datum: UTM, Zone 15
Soil Map Unit Name: Balkin, depressional, Balkin complex, 0-2% slopes, stony NWI Classification: PFO
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W30

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No	X	Depth (inches):	
Water table present?	Yes ____	No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No	X	Depth (inches):	

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-7

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	50	Y	FAC
2	*Acer rubrum*	15	Y	FAC
3	*Fraxinus nigra*	5	N	FACW
4				
5				
6				
7				
8				
9				
10				
		70	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	20	Y	FACU
2	*Fraxinus nigra*	12	Y	FACW
3	*Acer rubrum*	8	Y	FAC
4				
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Eurybia macrophylla*	25	Y	UPL
2	*Lathyrus venosus*	15	Y	FAC
3	*Rubus pubescens*	10	N	FACW
4	*Anemone canadensis*	6	N	FACW
5	*Calamagrostis canadensis*	4	N	OBL
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		60	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	14	35
Sapling/Shrub Stratum	8	20
Herb Stratum	12	30
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across all Strata: 7 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 71.43% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	4	x 1 =	4
FACW species	33	x 2 =	66
FAC species	88	x 3 =	264
FACU species	20	x 4 =	80
UPL species	25	x 5 =	125
Column totals	170 (A)		539 (B)

Prevalence Index = B/A = 3.17

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 2/1	100					Loam	w/high organic content
4-8	10YR 6/1	100					Loam	
8-14	10YR 6/3	70	10YR 6/1	30	D	M	Loam	
14								Rock - bottom of pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- X Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Rock
Depth (inches): 14

Hydric soil present? Y

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061412
Applicant/Owner: USS-Minntac State: MN Sampling Point OP-08
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex
Slope (%): 2% Lat.: 1720241 Long.: 17304872 Datum: UTM, Zone 15
Soil Map Unit Name: Balkin, depressional, Balkin complex, 0-2% slopes, stony NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches):	
Water table present?	Yes ____	No X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-08

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	50	Y	FAC
2	*Acer rubrum*	10	N	FAC
3				
4				
5				
6				
7				
8				
9				
10				
		60	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	40	Y	FACU
2	*Acer spicatum*	15	Y	FACU
3	*Amelanchier alnifolia*	8	N	FACU
4	*Acer rubrum*	7	N	FAC
5				
6				
7				
8				
9				
10				
		70	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Eurybia macrophylla*	25	Y	UPL
2	*Pteridium aquilinum*	15	Y	FACU
3	*Rubus pubescens*	10	Y	FACW
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		50	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	12	30
Sapling/Shrub Stratum	14	35
Herb Stratum	10	25
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 33.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	67	x 3 =	201
FACU species	78	x 4 =	312
UPL species	25	x 5 =	125
Column totals	180 (A)		658 (B)

Prevalence Index = B/A = 3.66

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-08

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 2/1	100					Loam	
3-10	10YR 6/3	70	10YR 6/1	30	D	M	Loam	
10-16	10YR 6/2	100					Loam	
16								bottom of pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061412
Applicant/Owner: USS State: MN Sampling Point OP-9
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Toe of Tailings Basin Berm Local relief (concave, convex, none): Concave
Slope (%): 2% Lat.: 1720170 Long.: 17304747 Datum: UTM, Zone 15
Soil Map Unit Name: Balkin, depressional, Balkin complex, 0-2% slopes, stony NWI Classification: PSS
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation X, soil X, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W31

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	X	No	____	Depth (inches): 2
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-9

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	20	Y	FAC
2	*Acer rubrum*	10	Y	FAC
3				
4				
5				
6				
7				
8				
9				
10				
		30	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Salix discolor*	35	Y	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
		35	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Glyceria striata*	25	Y	OBL
2	*Calamagrostis canadensis*	20	Y	OBL
3	*Onoclea sensibilis*	10	N	FACW
4	*Osmunda cinnamomea*	8	N	FACW
5	*Rubus pubescens*	7	N	FACW
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		70	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	6	15
Sapling/Shrub Stratum	7	18
Herb Stratum	14	35
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across all Strata: 5 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	45	x 1 =	45
FACW species	60	x 2 =	120
FAC species	30	x 3 =	90
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	135 (A)		255 (B)

Prevalence Index = B/A = 1.89

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR 3/2	100					Loam	
2-6	10YR 5/1	100					Loam	
6-14	10YR 6/2	90	10YR 5/4	10	C	M	Loam	
14								Bottom of Pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:
At 6-14", soil is mixed with clumps of clay material with gley and redox masses. Soil description is based on dc

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061512
Applicant/Owner: USS State: MN Sampling Point OP-10
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex
Slope (%): 1% Lat.: 1720166 Long.: 17304785 Datum: UTM, Zone 15
Soil Map Unit Name: Balkin, depressional, Balkin complex, 0-2% slopes, stony NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No ____	Depth (inches): ____	**Indicators of wetland hydrology present?** N
Water table present?	Yes ____	No ____	Depth (inches): ____	
Saturation present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____	

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-10

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	60	Y	FAC
2	*Betula papyrifera*	12	N	FACU
3	*Acer rubrum*	8	N	FAC
4				
5				
6				
7				
8				
9				
10				
		80	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Salix discolor*	10	Y	FACW
2	*Corylus cornuta*	8	Y	FACU
3	*Betula papyrifera*	7	Y	FACU
4	*Picea mariana*	5	N	FACW
5				
6				
7				
8				
9				
10				
		30	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Eurybia macrophylla*	30	Y	UPL
2	*Rubus pubescens*	20	Y	FACW
3	*Fragaria virginiana*	10	N	FACU
4	*Solidago canadensis*	6	N	FACU
5	*Glyceria striata*	4	N	OBL
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		70	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	16	40
Sapling/Shrub Stratum	6	15
Herb Stratum	14	35
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	4	x 1 =	4
FACW species	35	x 2 =	70
FAC species	68	x 3 =	204
FACU species	43	x 4 =	172
UPL species	30	x 5 =	150
Column totals	180 (A)		600 (B)

Prevalence Index = B/A = 3.33

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-1	10YR 3/1	100					Loam	
1-14	10YR 7/3	100					Loam	
14								Bottom of Pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061512
Applicant/Owner: USS State: MN Sampling Point OP-11
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Toe of Tailings Basin Berm Local relief (concave, convex, none): Concave
Slope (%): 52% Lat.: 1719022 Long.: 17304637 Datum: UTM, Zone 15
Soil Map Unit Name: Balkin, depressional, Balkin complex, 0-2% slopes, stony NWI Classification: PEM/PSS
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W32

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- X Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes	X	No		Depth (inches): 1
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches): 0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-11

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Abies balsamea*	20	Y	FAC
2	*Betula papyrifera*	10	Y	FACU
3				
4				
5				
6				
7				
8				
9				
10				
		30	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Salix discolor*	15	Y	FACW
2	*Acer spicatum*	10	Y	FACU
3	*Betula papyrifera*	6	N	FACU
4	*Ribes triste*	4	N	OBL
5				
6				
7				
8				
9				
10				
		35	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Calamagrostis canadensis*	35	Y	OBL
2	*Cirsium muticum*	25	Y	OBL
3	*Typha latifolia*	10	N	OBL
4	*Rumex britannica*	5	N	OBL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		75	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	6	15
Sapling/Shrub Stratum	7	18
Herb Stratum	15	38
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	79	x 1 =	79
FACW species	15	x 2 =	30
FAC species	20	x 3 =	60
FACU species	26	x 4 =	104
UPL species	0	x 5 =	0
Column totals	140 (A)		273 (B)

Prevalence Index = B/A = 1.95

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-1	10YR 2/1	100						Fibric Peat
1-6								See remarks below
6-12	N 7/0	100						
12								Bottom of Pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- X Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Bedrock
Depth (inches): 12

Hydric soil present? Y

Remarks:
1-6" consists of iron precipitate crust mixed with mine tailings material. This layer appears to have been forme

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892P City/County: St. Louis Sampling Date: 061512
Applicant/Owner: USS-Minntac State: MN Sampling Point OP-12
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex
Slope (%): 2% Lat.: 1718968 Long.: Datum: 17304636
Soil Map Unit Name: Balkin, depressional, Balkin complex, 0-2%, stony NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches):	
Water table present?	Yes ____	No X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-12

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Abies balsamea*	20	Y	FAC
2	*Betula papyrifera*	15	Y	FACU
3	*Acer rubrum*	5	N	FAC
4				
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	40	Y	FACU
2	*Acer spicatum*	30	Y	FACU
3				
4				
5				
6				
7				
8				
9				
10				
		70	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Rubus pubescens*	15	Y	FACW
2	*Acer rubrum*	10	Y	FAC
3	*Equisetum sylvaticum*	6	N	FACW
4	*Maianthemum canadense*	4	N	FACU
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		35	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	8	20
Sapling/Shrub Stratum	14	35
Herb Stratum	7	18
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	21	x 2 =	42
FAC species	35	x 3 =	105
FACU species	89	x 4 =	356
UPL species	0	x 5 =	0
Column totals	145 (A)		503 (B)

Prevalence Index = B/A = 3.47

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR 3/1	100					Loam	
2-8	10YR 6/2	95	10YR 5/6	5	C	M	Sandy Loam	
8-14	10YR 6/4	100					Sandy Loam	
14-18	10YR 7/1	100					Clay Loam	
18								Bottom of Pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- X Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Clay Hardpan
Depth (inches): 14

Hydric soil present? Y

Remarks:

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collection Return Project-7892N City/County: St. Louis Sampling Date: 061512
Applicant/Owner: USS State: MN Sampling Point OP-13
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R18W
Landform (hillslope, terrace, etc.): Drainageway Local relief (concave, convex, none): Convex
Slope (%): 1% Lat.: 1718632 Long.: 17304570 Datum: UTM, Zone 15
Soil Map Unit Name: Keewatin Nashwauk complex, 0-8% slopes, stony NWI Classification: PFO
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W-33

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	____	No	X	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 6

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Groundwater discharge seeps in general area of this OP

VEGETATION - Use scientific names of plants

Sampling Point: OP-13

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	70	Y	FAC
2	*Betula papyrifera*	10	N	FACU
3				
4				
5				
6				
7				
8				
9				
10				
		80	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	12	Y	FACU
2	*Ribes americanum*	8	Y	FACW
3	*Prunus virginiana*	7	Y	FACU
4				
5				
6				
7				
8				
9				
10				
		27	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Athyrium filix-femina*	40	Y	FAC
2	*Aralia nudicaulis*	18	Y	FACU
3	*Rubus pubescens*	17	Y	FACW
4	*Calamagrostis canadensis*	5	N	OBL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		80	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	16	40
Sapling/Shrub Stratum	5	14
Herb Stratum	16	40
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across all Strata: 7 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 57.14% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	5	x 1 =	5
FACW species	25	x 2 =	50
FAC species	110	x 3 =	330
FACU species	47	x 4 =	188
UPL species	0	x 5 =	0
Column totals	187 (A)		573 (B)

Prevalence Index = B/A = 3.06

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

X Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 2/1	100					Loam	
4-8	10YR 5/3	95					Sandy Loam	
8-16	10YR 6/3	20	10YR 6/2	80	D	M	Sandy Clay Loam	
16								Bottom of pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:
Assumed 8-16 " layer of sandy clay loam is fine textured soil for purposes of F3

USS Minntac
West Tailings Basin

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Collectiton Return Project-7892P City/County: St. Louis Sampling Date: 061512
Applicant/Owner: USS-Minntac State: MN Sampling Point OP-14
Investigator(s): DeMars/Essig Section, Township, Range: Sec 6, Twp 59N, R 18W
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex
Slope (%): 100% Lat.: 1718517 Long.: 17304533 Datum: UTM Zone 15
Soil Map Unit Name: Keewatin Nashwauk complex, 0-8% slopes, stony NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches):	
Water table present?	Yes ____	No X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: OP-14

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Populus tremuloides*	40	Y	FAC
2				
3				
4				
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Corylus cornuta*	40	Y	FACU
2	*Amelanchier arborea*	20	Y	FACU
3	*Prunus virginiana*	12	N	FACU
4	*Alnus incana*	8	N	FACW
5				
6				
7				
8				
9				
10				
		80	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Pteridium aquilinum*	20	Y	FACU
2	*Rubus pubescens*	15	Y	FACW
3	*Impatiens capensis*	10	Y	FACW
4	*Calamagrostis canadensis*	5	N	OBL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		50	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	8	20
Sapling/Shrub Stratum	16	40
Herb Stratum	10	25
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	5	x 1 =	5
FACW species	33	x 2 =	66
FAC species	40	x 3 =	120
FACU species	92	x 4 =	368
UPL species	0	x 5 =	0
Column totals	170 (A)		559 (B)

Prevalence Index = B/A = 3.29

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** OP-14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 3/1	100					Loam	
3-14	10YR 6/4	95	10YR 7/2	5	D	M	Silty Loam	
14-16	10YR 7/3	100					Loam	
16								Bottom of pit

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks: